THE IRON TRADE REVIEW

VOLUME XXXIX — CLEVELAND, AUGUST 2, 1906 — NUMBER 31

RECORD BREAKING

SPECIFICATIONS RECEIVED AT MANY PLANTS.

High Pig Iron Prices from Concerns Having None to Sell—Large Sales of Basic in the East.

The very heavy specifying by nearly all users of iron and steel products is a very prominent feature of present strong conditions. Much heavier contracting has characterized some other periods, but the tendency not to specify on contracts when business declines is well understood in the trade. When, however, specifications are received in the great volume in which they are now coming in, there can be no doubt of genuine prosperity. One of the largest independent interests reports that in July the specifications received were the heaviest in any month in its existence. This is only one of many indications that the steel corporation, with its unprecedented earnings, has no monopoly on prosperity. Present conditions are remarkably free from unfavorable features, but the time has undoubtedly arrived when it would be well to consider some quotations, especially on pig iron, with allowances. The very high prices occasionally named generally come from concerns which have disposed of their product for the remainder of the year, although in some cases buyers have been willing to pay liberally for prompt shipment.

Buying East and West. The heavy buying of basic pig iron in eastern Pennsylvania has been a prominent feature, the aggregate amount being about 100,000 tons. In Chicago there has been heavy buying of foundry grades aggregating some 50,000 tons. In all centers the market has been very strong with a tendency to advance. For southern grades $14 Birmingham seemed to be pretty well established, although large sales have been made within a few days at $13.50. For northern foundry irons $17 valley furnace for No. 2 is ordinarily the basis. Foundries are melting more rapidly than they expected, and there are many requests for anticipated deliveries.

Plates and Structurals. The demand for plates and shapes continues active, there being many small contracts for structural material for industrial concerns and railroad bridges, while ship building plants and car builders steadily contribute to the demand for plates. The principal producer of sheets has filled its order books in advance as far as its policy allows and other interests are well supplied with orders. Deliveries are slow. Specifying on tin plate is heavy in anticipation of the large crops.

Bar Market is Active. The bar market is strong and active. One eastern concern has obtained a premium of $2 per ton on steel bars, but manufacturers are, as a rule, content to sell at quotations which have prevailed for some time. The demand for track supplies is illustrated by the sale of 100,000 kegs of spikes in the Chicago market. The merchant pipe market is improved.

LARGEST EARNINGS

In the History of the Corporation.—Dividend on Common Declared.

New York, July 31.—After receiving the report showing the largest net earnings of any quarter in the history of the corporation, the directors of the United States Steel Corporation this afternoon declared a dividend of one-half of one per cent on the common stock for the quarter ending March 31, and one-half of one per cent for the quarter ending June 30, 1906, to be paid Oct. 1, 1906, from the surplus net earnings for the six months ending June 30, 1906, to stockholders of record Sept. 8, 1906. Books open October 2. Although the admirable showing justifies this declaration of a dividend on the common stock, the action was a distinct surprise. The usual dividend on preferred was declared. The net earnings for the June 1 quarter amounted to $40,125,033, the largest by far of any previous three months. The surplus for the quarter was $5,231,106. The unfilled business of the corporation on June 30 amounted to 6,809,589 tons, compared with 7,018,712 tons on March 31 and 7,605,086 tons at the end of 1905. The directors present were: J. P. Morgan, H. H. Rogers, G. W. Perkins, Thomas Morrison, E. C. Converse, Marvin Hughitt, W. E. Corey, John F. Dryden, Robert Winsor, H. C. Frick, N. B. Ream and J. H. Reed. The statement of earnings was as follows:

NET EARNINGS.

April, 1906		$12,581,902
May, 1906		14,041,601
June, 1906		13,501,530
Total net earnings after deducting, each month, the expenditures for ordinary repairs, renewals and maintenance of plants, employes' bonus funds, and also interest on bonds and fixed charges of the subsidiary companies		$40,125,033
Less, appropriations for the following purposes, viz.: Sinking Funds on Bonds of Subsidiary Companies	547,756	
Depreciation and Reserve Funds (regular provisions)	5,604,289	
Special Improvement and Replacement Funds	2,500,000	
		8,652,045
Balance of net earnings		$31,472,988
Deduct: Interest for the quarter on U. S. Steel Corporation Bonds outstanding	$5,718,162	
Sinking Funds for the quarter on U. S. Steel Corporation Bonds, viz.: Installments	$1,012,500	
Interest on bonds in Sinking Funds	206,301	
	1,218,801	
		6,936,963
Balance		$24,536,025
*Dividend for the quarter on Preferred Stock of United States Steel Corporation, 1¾ per cent		6,304,919
Surplus for the quarter		$18,231,106
Less, appropriated from Surplus for the following purposes, viz.: On account of expenditures made and to be made on authorized appropriations for additional property, construction and discharge of capital obligations		13,000,000
Balance of Surplus for the quarter		$5,231,106

*Payable August 30, 1906; books close August 8, open August 31.

THE WEEK IN IRON CENTERS.

PITTSBURG.

High Prices for Prompt Shipment of Pig Iron, Which is Scarce.

Office of THE IRON TRADE REVIEW, 521 PARK BUILDING, July 31

While on the face of things the market, during the week under review, has shown even greater strength than during the previous week, there has been no change in the situation as far as finished material is concerned, but an element of fictitiousness is evident in the quoted prices of pig iron, inasmuch as the scarcity has about reached that point where consumers who need the material badly are willing to pay most any price asked in order to insure prompt delivery.

The demand for deliveries on old contracts has been very heavy and, as many of the furnaces are behind on their shipments, consumers are beginning to get urgent on account of there being practically on stocks on hand either at the furnace or at plants of consumers. Inquiry for both foundry and Bessemer pig iron is good at the advance prices and considerable business has been closed. The demand for basic pig iron has not been so strong, but as is the case in other grades, there is practically none to be had for delivery short of September. A peculiar feature of the situation regarding foundry iron is that despite the scarcity and the advanced prices, creating a wide spread between foundry pig iron and cast scrap, there has been but little of the latter moving, although it may be bought from $1.50 to $2 cheaper than pig iron.

As far as semi-finished material is concerned there has not been any noticeable change, either for better or worse, small billets and sheet bar both being extremely scarce at prices that have prevailed for several weeks past without change.

While some plate mills are practically filled up for the remainder of the year and are not making any promises on deliveries, other interests are in shape to make deliveries on both sheared and universal plates within three to five weeks and the same may be said in regard to the steel bar situation. While the mills are not catching up to any great extent, the business is in very good shape and orders are keeping just a pace ahead of the finishing mills, leaving them in very comfortable shape.

The past week has not been as strong on new rail business as its predecessor, but inquiries were good and several large negotiations are under way, western railroads having started them. Several of the big trunk lines are also negotiating for cars, many of them for replacement of present rolling stock, while a good percentage will be new tonnage.

Pig Iron.—There has been a strong demand for Bessemer and foundry iron during the week under review and several sales of fairly large tonnages have been made, among the buyers being the Standard Sanitary, Westinghouse Machine, United Engineering and others, most of the iron being for forward delivery. The inclination, in the face of the evident scarcity, is to cover in advance and several interests have gone so far as to cover for at least a part of their requirements well into the first quarter of next year. Three thousand tons of Bessemer in lots from 500 to 1,500 tons for August and September delivery sold for $18 valley. All reports are to the effect that the valley furnaces have no stocks on hand; in fact, are for the most part behind on shipments, and as far as consumers of foundry iron are concerned, they are in but little better shape regarding stocks. Bessemer pig iron is a scarce article and to a close observer there are indications of fictitious quotations, as the material for the most part could not be secured at all and one price is as good as another under these circumstances.

Southern No. 2 is quoted strong at $14, Birmingham and southern forge iron at $12.50 to $13. Northern No. 2 is quoted all the way from $16.75 to $17.25, but the difference, or $17, is about the market, although higher prices have been paid and one interest has announced its intention to hold what northern foundry iron it has for $17.50, valley, with a 75c freight to Pittsburg. Northern forge iron is quoted $16.85 to $17.10, Pittsburg. Bessemer iron, which is quoted $17.75 to $18 valley, is closely held and for delivery before September is almost impossible to obtain. One sale of 10,000 tons at $17.50, valley, has been reported for September delivery, but the seller or purchaser could not be learned. Basic iron, of which there are comparatively few purchasers, is strong in tone and is quoted $17.25 to $17.50, valley. With the existing high prices on northern iron considerable Virginia and southern iron has been sold. We quote:

Bessemer Valley	17.75 to 18.00
Bessemer, Pittsburg	18.60 to 18.85
No. 1 Foundry, Pittsburg	18.10 to 18.35
No. 2 Foundry, Pittsburg	17.60 to 17.85
Gray Forge, Pittsburg	16.50 to 16.85
Basic, Valley	17.25 to 17.50
Basic, Pittsburg	18.10 to 18.35

Ferro-Manganese.— For August delivery the market is quoted from $87.50 to $90, delivered Pittsburg, and for September and October delivery, $82.50 to $85.

Steel.—Small Bessemer and open hearth billets are hard to obtain and we quote $27.50, Pittsburg. The increasing demands of the finishing mills has decreased the supply of billets in the open market, with the exception of a few odd lots that are diverted from usual courses, are not to be obtained. Sheet bars are as scarce as they have been for some time past and we quote $29, Pittsburg.

Skelp.—There has been no change in price or conditions during the week, the improved tone of the merchant pipe business as far as tonnage is concerned having brought out some inquiries. After Sept. 1 the Youngstown Sheet & Tube Co. will be in the market with skelp and plates 6 to 63 inches. On light gauges and narrow widths we quote as follows:

Bessemer grooved, 1.57½c to 1.60c; sheared, 1.65c to 1.70c; basic groved, 1.60c to 1.65c; sheared, 1.65c to 1.70c; iron skelp, grooved, 1.65c to 1.70c; sheared, 1.80c to 1.85c.

Muck Bar.—In the absence of inquiry or any movement, we quote muck bar nominally at $29.

Hoops and Bands.—There has been but little activity in hoops and bands, the large cooperage interests not having placed their business for the year. We continue to quote, unchanged, as follows:

Hoops, 1.90c in carload lots, and 2c on less than carload lots, bands, 1.50c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Structural Material.—Several contracts of fair tonnages have been placed during the week in structural material, the largest being for railroad bridge work. The mills, while they have a large tonnage on the books and some of them practically filled for the remainder of the year, are in position to take on a large amount of business and from some interests delivery can be obtained within a month or six weeks. The encouraging feature of the situation, which is showing up in excellent condition, is the large number of small scattered contracts, a large proportion of them being enlargements to manufacturing plants. Several big contracts are under negotiation. On account of labor troubles the construc-

tion companies are not announcing their new work. New inquiries are very heavy and there has not been any let-up in the number, and, while the individual tonnages are not great, the aggregate is large. We quote:

Beams and channels, 15 in., and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from three to six inches, inclusive, 1.70c; over six inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.60c base.

Plates.—Consumers of both universal and sheared plates are specifying very freely against their existing contracts and in some instances are having trouble in getting deliveries, the leading interest having practically booked up to its capacity for the remainder of the year, although other interests are in shape to give deliveries within six weeks to two months. Where the steel car companies have taken business running into next year, they have made contracts protecting themselves on their material. Prices remain unchanged as follows:

Tank plate ¼ inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill, Pittsburg. Light plate schedule, No. 10, 1.70c; Nos. 11-12, 1.75c; Nos. 13-14, 1.80c; Nos. 15-16, 1.90c. Extras on the regular plate schedule are as follows per 100 pounds, boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates, varying not more than four inches, in width at ends, narrowest end not being less than 30 inches, 0.10c; complete circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gauges under ¼ inch to and including 3-16 inch plates on thin edges, 0.10c; under 3-16 inch to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—The leading interest is filled to capacity as far ahead as its policy permits the acceptance of business in advance of delivery and the specifications are heavy. The specifications are slightly in excess of shipments and as a consequence there is but little progress being made in the way of catching up on deliveries. The independent interests have about all the business they can handle and the market is in excellent shape. We quote as follows:

Black steel sheets, box annealed, cold rolled, one pass Nos. 11-12, 2.10c; Nos. 13-14, 2.15c; Nos. 15-16, 2.20c; Nos. 17-21, 2.25c; Nos. 22-24, 2.30c; Nos. 25-26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.65c; No. 30, 2.75c; galvanized, Nos. 10-11, 2.45c; Nos. 12-14, 2.55c; Nos. 15-16, 2.65c; Nos. 17-21, 2.80c; Nos. 22-24, 2.95c; Nos. 25-26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.80c; No. 30, 4.05c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation; $3.10 per square for No. 28 galvanized, 2½-inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Tin Plate.—The canning interests are specifying very freely in preparation for the big business expected to result from the heavy crops. The American Can Co. has decided to erect a large plant near the Shenango mill of the American Sheet & Tin Plate Co., at New Castle, Pa., and ground will be broken within a short time. We quote $3.75 per base box, f. o. b. Pittsburg, 14 x 20 100-pound-cokes, terms 30 days, less two per cent off for cash in ten days.

Merchant Pipe.—There has been a good demand for merchant pipe and several good contracts have been placed, the tonnages not being particularly large individually, but the total for the week has been good. Prices remain unchanged, the extreme discount being 81 per cent and 5 off. While no large line pipe contracts have been closed, there has been considerable tonnage placed in five mile lots or smaller. On pipe we quote the official prices, consumers' carloads, with jobbers' carloads one point higher discount:

	Steel		Iron	
Consumer's Carloads	Black	Galv.	Black	Galv
⅛ and ¼ inch	71	55	67½	51½
⅜ inch	73	59	69½	55½
½ inch	75	63	71½	59½
¾ to 6 inches	79	69	76	66
7 to 12 inches	74	59	71	55½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	60½	48½
½ to 4 inches	71	59	67½	55½
4½ to 8 inches	67	55	63½	51½
Double extra strong plain ends, ¼ to 8 inches	60	49	56½	45½

Boiler Tubes.—A good business in boiler tubes is being done and new business is running along about even with that of several months past. We quote as follows:

	Steel	Iron
1 to 1¼ inches	59	45
1¼ to 2¼ inches	62	45
2¼ inches	64	50
2¾ to 5 inches	70	57
6 to 13 inches	62	45

Less than carload lots two points less.
2½ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Steel Bars.—Specifications are heavy and new business is good, one company asking a premium for quick delivery, but the policy of other interests being against the acceptance of premium business as it works against the interests of regular business. Prices are unchanged as follows:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base; half extra steel card.

Merchant Bars.—There has been a considerable movement in iron bars during the week under review and while prices were shaded to 1.50c Pittsburg last week on a desirable order, the 1.55c Pittsburg price has been re-established to local consumers and for western shipment the price remain unchanged at 1.50c base Pittsburg. We quote:

Common iron bars, 1.55c, Pittsburg, in carload lots, 1.60c in less than carloads; for western shipment 1.50c base Pittsburg; Bessemer steel bars, 1.50c; plow and cultivator, 1.50c net; channels, angles, zees and tees, under three inches, 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds, of a size, 0.30c advance.

Rails and Track Material.—Neither the new business placed nor the inquiries received by local mills were as large as they were during the week preceding and only about 10,000 tons were closed for during the week. The demand for light rails continues strong. The demand for railroad spikes is unprecedented, mills are filled up to October and deliveries are not being promised before that time on new business. We quote: Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $30; 20 pounds, $28.50; 25 to 45 pounds, $28.50; angle bars for standard sections, 1.50c; spikes, $2.20 to $2.25.

Wire and Wire Nails.—For this time of the year, when conditions are usually a little bad and prices sagging, the market is in very good condition. There is a little business moving and prices are not being shaded to obtain what is to be had. We quote:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carload lots, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire, $1.70 to jobbers and $1.75 by carload.

Old Material.—Prices are firm, and the market is strong, but quiet. One of the features for which it is hard to ac-

count is the inactivity of melting stock and cast scrap with the wide spread that exists between them and pig iron. The scarcity of pig iron has apparently not increased the movement in scrap. Any purchase of large tonnage would have the effect of advancing prices. We quote, gross tons, delivered:

Heavy melting stock, $16; No. 1 cast scrap, $15 to $15.50; cast borings, $9; bundled sheet scrap, $13.50; malleable scrap, $15.50; No. 1 railroad wrought, $16.50; low phosphorus scrap, $18 to $18.50; wrought turnings, $11.50; busheling scrap, $14 to $14.50; iron axles, $25.50 to $26; old rails, rerollers, $17.50.

Coke.—There is a brisk demand for both foundry and furnace coke and prices are firm and steady. The labor situation in the coke region has not shown any material improvement. On foundry coke we quote $2.95 to $3.10, ovens, and on furnace coke, $2.65 to $2.75. The estimated production in the Connellsville region for the week ending July 21 was 272,393 tons and for the lower Connellsville region 102,668 tons. One hundred and thirty-seven of the 160 ovens of the Struthers works of the Struthers Coal & Coke Co. are now in operation.

CLEVELAND.

Anxiety About Ore.—Pig Iron Scarce and Prices Firm.

Office of THE IRON TRADE REVIEW, Browning Building, July 31.

Iron Ore.—In several instances formal application has been made by furnace men to ore sellers to be protected in securing certain tonnages of ore, particularly Bessemer, when the buying begins. The display of anxiety at so early a period is unprecedented, but is easily accounted for owing to the difficulty which furnaces are now having in obtaining ore. An advance of 50 cents per ton on Bessemer ore, and nearly that amount on non-Bessemer, will gladly be paid by furnace men who are seeking in vain to meet their requirements. Of course, there has not yet been any discussion as to prices, nor have actual sales been made. The statistics of the shipments for July are not yet available. The general opinion is that they will not greatly exceed those of June. Some of the large vessels are now taking coal to upper lake ports, and this retards return trips. Owing to the high rates being paid on grain, all vessels which usually cater to the grain traffic are now engaged in it. Hence, there is very little wild tonnage on ore, and it is not probable that 6,000,000 tons of ore will be shipped this month or next. Last week, however, was the heaviest in the history of the principal shipper.

Pig Iron.—The scarcity of all grades of pig iron has been emphasized within a few days, and prices are very firm and tending upward. Foundrymen are melting more than they expected, and requests for anticipation of shipments are urgent and numerous. No. 2 pig iron could easily be sold in Cleveland at $18, and some shipped from the Ironton district has been sold as high as $18.15. Some furnace men are holding for as high as $17.50 at the furnace. There does not seem to be any prospect that the present condition will be relieved, as more furnaces will be compelled to blow out for repairs and others are not working well. There is no likelihood of increased production in any direction. We quote f. o. b. Cleveland, as follows:

Bessemer	$18.25 to 18.60
No. 1 Foundry	18.00 to 18.25
No. 2 Foundry	17.75 to 18.00
No. 3 Foundry	17.00 to 17.50
No. 2 Southern	17.60 to 17.85
Gray Forge	16.60 to 17.00
Gray Forge Southern	15.85 to 16.25
Lake Superior charcoal	19.50 to 20.00

Coke.—Producers are holding their output in anticipation of much higher prices in the fall, and it is difficult to contract for advanced delivery. It is almost equally hard to buy for prompt shipment, and the lowest quotations obtainable are $2.60 for furnace and $3 for foundry coke.

Finished Material.—There is great activity in nearly all kinds of finished material with the possible exception of pipe. The Republic Iron & Steel Co. reports that during July specifications were the heaviest of any month in its history. This is, indeed, a remarkable record for a mid-summer month. The jobbing trade has improved within a few days and jobbers are now very busy. Bridge requirements make a good steady tonnage all the while, car building plants are ordering freely, demands for the building of cranes, dredges, hoisting and other machinery are heavy, and a large amount of material is going into new industrial plants. Plates are strong with mills gradually falling behind in their delivery. Delivery is also very slow on sheets and the demand is active. There is an excellent demand for bar iron. The Empire Rolling Mill Co. has placed its new mill in operation, and its product for this year has been sold. There is heavy buying of light rails at the recently advanced schedule of prices. There is steady demand for tool steel with many replacement orders.

Old Materials.—A stronger tone prevails in the local market and dealers are holding for slightly advanced prices. Mills, however, are slow to recognize the advance and trading is consequently light. Tenders close during the week on three large lists, those of the Pennsylvania lines west, Erie and B. & O. We quote, Cleveland delivery, as follows.

Old iron rails	$21.00 to 22.00
Old steel rails (over 6 feet)	16.00 to 17.00
Old steel rails (under 6 feet)	16.50 to 17.00
Old car wheels	16.50 to 16.75
Steel boiler plate	13.00 to 14.00
Steel axles	19.00 to 20.00
Malleable iron (railroad)	15.00 to 15.50
Malleable iron (agricultural)	13.00 to 13.50
Heavy steel	15.00 to 15.50
Country mixed steel	13.00 to 13.50

We quote net tons as follows:

No. 1 R. R. wrought	15.50 to 16.00
No. 1 busheling	13.00 to 13.50
No. 1 machine cast	13.50 to 14.00
Iron axles	22.00 to 23.00
Axle turnings	10.50 to 11.00
Wrought turnings (free from cast)	9.50 to 10.00
Grate bars	10.00 to 10.50
Pipes and flues	12.00 to 12.50
Tank iron	11.50 to 12.00
Hoop and band iron	8.00 to 8.50
Sheet iron	7.00 to 7.50
Wrought drillings	9.50 to 10.00
Stove plate	10.00 to 10.50
Cast borings	7.50 to 8.00

CINCINNATI.

Pig Iron Market Much Stronger and Sales are Heavier.—Coke Firm.

July 31, 1906.

Pig Iron. — The market shows decided strength and there has been a better tonnage sold the past week than for several preceding weeks. One sales agency reports an aggregate of 11,000 tons, mostly in small orders for deliveries over the next five months and inquiry for about 10,000 tons of the same class of business is pending. Some agencies have but little iron to offer. Sales of southern iron were mainly at $13.50 Birmingham, with transactions reported at $13.75 and $14.00. The leading pipe interests have bought some iron, but the tonnage is not made public. Cincinnati agencies have sold large consumers in Pittsburg some round lots. Northern iron is firmer, with southern Ohio furnaces asking $17.00, and we note one sale of 1,000 tons of northern No. 2 foundry at $17.00 furnace for delivery over the balance of the year and 1,000 tons of northern malleable for last quarter delivery at $16.75 Ironton district. Consumers are generally asking to have iron hurried forward on contracts. Some inquiry has come out for delivery in the first half of 1907.

The situation as to prices is decidedly strong and the opinion generally expressed is that the $14.00 price for southern iron is practically established, although sales are still being made at $13.50. The latter figure is, however, growing scarcer as sales are being made. A number of southern interests are declining firm offers at anything below $14.00 Birmingham. In northern irons tonnage for sale in the Ironton district for the balance of the year is limited with furnaces inclined to advance their views as the remaining supply is diminished. There is considerable talk among the sales agencies of a probable shortage of iron based on the reported sold up con-

dition of southern producers. The higher grades are relatively scarcer than the cheaper irons. Spot iron is very scarce and as disappointments in deliveries on contract occur it is difficult for both consumers and sales agencies to find anything for immediate delivery. We quote f. o. b. Cincinnati:

Southern Foundry No. 1	$17.00 to 17.50
Southern Foundry No. 2	16.50 to 17.00
Southern Foundry No. 3	16.00 to 16.50
Southern Foundry No. 4	15.50 to 16.00
Southern Foundry No. 1, soft	17.00 to 17.50
Southern Foundry No. 2, soft	16.50 to 17.00
Gray Forge	15.00 to 15.25
Northern Foundry No. 1	18.15 to 18.65
Northern Foundry No. 2	17.65 to 18.15
Northern Foundry No. 3	17.15 to 17.65
Jackson County Silvery, 8 per cent	20.15 to 20.65
Southern Charcoal	24.00 to 25.00

Finished Material.—The market continues steady and moderately active. There is a fair demand for bars and specifications on contracts are good for this season of the year.

We quote: bars at 1.63c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.68c. We quote black sheets, No. 27 at 2.53c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.70c; No. 16, 2.25c; No. 14, 2.15c; No. 12, 2.10c. Tank plates are firm and sell out of store at 2c to 2.10c for ¼-inch and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.35c from stock and angles at 2.10c to 2.15c for base sizes.

In merchant pipe inquiry is good and prices well maintained. We quote f. o. b. Cincinnati as follows:

MERCHANT PIPE.
(Basing Discounts)

	Steel Pipe		Guaranteed Wrought Iron Pipe	
	Black Per cent	Galv. Per cent	Black Per cent	Galv. Per cent
⅛ and ¼ inches	69.7	53.7	....	....
⅜ inch	73.5	61 3	....	....
½ inch	73 7	61.7	....	....
¾ to 6 inches	77.7	67.7	....	....
7 to 12 inches	72.7	57.7	....	....

Coke.—Considerable contracting in foundry coke has been done the past week and prices hold firm. Quotations in the leading coke producing districts are as follows:

Wise County, Va. Furnace Coke prompt shipment	$2.50 per ton
Wise County, Va. Foundry Coke on contracts	$3.00 to 3.25 per ton
Pocahontas Furnace Coke prompt shipment	$1.85 to 2.25 per ton
Pocahontas Foundry Coke on contracts	2.75 to 2.85 per ton
Connellsville Furnace Coke prompt shipment	2.50 to 2.85 per ton
Connellsville Foundry Coke on contracts	2.90 to 3.00 per ton
New River Foundry Coke on contracts	2 80 to 3.00 per ton
New River Furnace Coke, prompt shipment	2.25 to 2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 to $1.70 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market remains inactive and not quotably changed. We quote f. o. b. Cincinnati:

Old No. 1 railroad wrought, net tons	$14.00 to 14.50
Cast machine and foundry, net tons	12.50 to 13.00
Old iron rails, gross tons	20.00 to 20.50
Old steel rails, gross tons	15.50 to 16.00
Old short lengths, gross tons	16.00 to 17.00
Old iron axles, net tons	22.00 to 23.00
Heavy melting scrap, gross ton	15.00 to 15.50
Stove plate, net tons	10.00 to 10.50
Wrought turnings, net tons	9.00 to 9.50
Cast borings, net tons	7.00 to 7.50
Car wheels, net tons	16.00 to 16.50

PHILADELPHIA.

Heavy Buying of Basic.—Many Foundries Have Not Covered.

July 31.

Pig Iron.—The feature of the exceptionally active market of the past week has been the heavy sales of basic iron, of which not far from 100,000 tons have been sold by local furnaces to eastern mills. Two Coatesville establishments are reported to have taken between them 45,000 tons, while large sales have been made to mills at Conshohocken, Phoenixville, Harrisburg, and other near-by points. In some instances $18 a ton has been paid. As a result of these very large purchases, most of the important steel-making plants in this territory have pretty well covered their requirements for the remainder of the year. It is well known, however, that many foundrymen, both large and small, have still to make their purchases for the last quarter and their orders within the next few weeks promise to make an embarrassing situation. Production has been reduced within the past few days by the blowing out of one or two more furnaces and many sellers are already far behind in their deliveries. If in such a condition of affairs numerous orders are placed in the next few weeks, there must necessarily be an advance in prices. Furnace men have no disposition to take advantage of consumers, but, as the latter have persistently rejected all warnings, they must now pay for their lack of forethought. Foundry irons have been in good demand, and for anything like prompt delivery of No. 2 $19 has been asked, though most transactions have been nearer $18.75. Most of the heavy sales of basic have been at $17.75, but where the demand has been urgent $18 has been paid for deliveries in August. The market may be described as strong and in splendid condition, with prices ranging as follows:

No 1X Foundry	$19.25 to 19.50
No. 2X Foundry	18.60 to 19.00
No. 2 Plain	18.00 to 18.25
Standard Gray Forge	16.25 to 16.50
Basic	17.75 to 18.00
Low Phosphorus	24.75 to 25.00

New Material. — In sympathy with the buoyant pig iron market, which presages great future activity, the demand for finished material, particularly structural material and plates, has been good, and the published requirements of the railroads and ship builders, especially those on the great lakes, show there is to be an abundance of business for the mills for many months to come. As yet there is no asking of premiums, but prices are held firmly and bar iron is reported in better demand. Prices remain unchanged as follows:

Beams, channels and angles according to specifications, 1.83½c to 2c; refined iron bars, 1.63½c to 1.73½c; steel bars, 1.63½c to 1.73½c; plates, 1.73½c to 1.83½c.

Old Material.—The improvement which began about a fortnight ago continues, and under slightly better buying from the mills there has been a further advance in prices. These may be quoted as follows:

Old steel rails	$17.00 to 17.50
No. 1 steel scrap	16.25 to 16.75
Old steel axles	18.50 to 19.00
Old iron axles	25.50 to 26.00
Old iron rails	20.00 to 21.00
Old car wheels	16.00 to 16.50
Choice scrap, R. R. No. 1 wrought	18.00 to 18.50
No. 1 yard scrap	16.00 to 16.50
Machinery scrap	15.75 to 16.25
Low phosphorus scrap	20.00 to 20.50
Wrought iron pipe	12.90 to 13.50
No. 1 forge fire scrap	12.75 to 13.25
No 2 forge fire scrap, ordinary	10.00 to 10.50
Wrought turnings	11.50 to 12.00
Axle turnings, heavy	12.50 to 13.00
Cast borings	9.50 to 10.00
Stove plates	11.50 to 12.00

NEW YORK.

Heavy Sales of Basic.—Foundry Iron Firm, But as Yet no Scarcity.

Office of THE IRON TRADE REVIEW,
ROOM 1315, No. 150 NASSAU ST., July 30

Pig Iron.—The market during the past week has been remarkably active for this season of the year. All classes of pig have sold freely, but the round tonnages of basic bought and sold have been the chief feature of interest. Transactions in this grade in the east make a total of between 60,000 and 70,000 tons. With the exception of 15,000 tons which goes to Buffalo, practically the entire amount will be delivered at eastern mills before the end of the present year. Deliveries of the Buffalo allotment will extend into 1907. Forward sales were effected on the basis of $17.50 delivered, but spot sales as a rule brought a little more money. Buyers are apparently eager for more on the same basis, and considerable tonnages, including one of 12,000 tons, are still under negotiation.

Business in foundry grades has not been quite so voluminous, but the total for the week is far above the average for this season of the year. All classes of melters have bought and experience seems to show that not a few foundrymen have neglected to cover requirements for the remainder of the year until their regular providers have become unable to supply their wants. Several of the large producers are for

a time out of the market and representatives are in many cases forced to resort to shopping in order to hold their customers. There were scattering sales of mill irons. It is interesting to note that a disposition to place contracts for delivery in the first and even the second quarter of 1907 has already made its appearance.

In the foundry grades there were no individual sales of startling magnitude. A number of purchases ranging from 1,000 to 3,000 tons each have been made by general and machine foundries, and manufacturers of railroad and electric equipment, pipe founders and other melters. The General Electric Co. is in the market for 5,000 tons of foundry grades, and negotiations are progressing on one lot of 6,000, another of 4,000 tons and several of 2,000 and 1,000 tons. Contracts pending make a total of between 15,000 and 20,000 tons.

Ferro-manganese is in active demand, and sales of the week in the local market aggregate more than 6,000 tons. The largest single sale involved 3,000 tons for nearby delivery. Prices for spot at tidewater range from $37.50 to $95, and for future delivery from $78 to $85 according to quantity and brand.

The following are prices of pig iron at tidewater:

Northern No. 1 Foundry	$18.25 to 19.00
No. 2 Foundry	17.75 to 18.25
No. 2 Plain	17.50 to 18.00
No. 1 Southern Foundry	17.50 to 18.00
No. 2 Southern Foundry	17.00 to 17.50
No. 3 Southern Foundry	16.50 to 17.00
No. 4 Foundry	15.50 to 16.00

Certificates and Standard Contracts.—Although trading in certificates and warrants has not been more active than during previous weeks, still prices have strengthened and traders are beginning to take more interest. They say that conditions are now more favorable and with the supply of pig iron in the present state buying and selling on 'change will possess advantages which will attract business. There were no sales of note during the week. Following are today's quotations for standard foundry contracts:

Standard Foundry Contracts.

	Bid.	Asked.
July	17.50	
August	17.50	18.00
September	17.70	18.00
October	17.75	18.00
November	17.65	18.00
December	17.70	18.00

Finished Iron and Steel.—The market for finished material has been quiet, but it has been a quiet of suspended animation rather than an actual dullness. So many of the pivotal personages upon whom the larger contracts directly depend have chosen the heated days of the past few weeks for an annual rest that the volume of business has actually been affected. Business in both rails and structural shapes has been comparatively small in volume. Reports of rail sales received too late for the previous issue include the following for 1907 delivery: Norfolk & Western, 11,000 tons; Brinson railway, 3,000; Lehigh Valley, 5,000, making a total for that road of 12,500; Pittsburg & Lake Erie, 9,500; Swift & Co., 1,500, for delivery during the present year; Philadelphia & Reading, 17,000; Chicago, Burlington & Quincy, 10,000; Chicago & Eastern Illinois, 5,000; Evansville & Terre Haute, 1,300, and miscellaneous 13,000.

Unless the contract for the rail mill at Gary arrives during the next two days the July figures on the American Bridge Co.'s books will not reach the 60,000-ton mark, which is the monthly aim. There is, however, enough business in sight to make up the deficiency in a very few days of the month following. Among recent orders secured by the company were: 2,000 tons of bridge material for grade crossings on the Grand Trunk; 900 tons for a similar purpose for the Pennsylvania R. R.; 300 tons for the Copper Range R. R. Contracts were also awarded for 500 tons of steel required in the erection of a new building for the American Museum of Natural History, New York, and for an equal amount for a new dormitory for Barnard College. An order for 750 tons of material for bridges on the Michigan Central R. R. was secured by the American Bridge Co. Contracts for a number of moderate sized tonnages were awarded the Pennsylvania Steel Co., the McClintic-Marshall Construction Co., and others. None of the larger projects previously mentioned in these columns as pending has advanced materially during the week.

The plate trade enjoys a fair, seasonable demand. A number of ship-building projects are under way and a large contract for pipe plates is likely to materialize in a few days. A moderate amount of new business in bar iron developed. The strike among the mill workers is said to be in a fair way toward settlement.

The following are prices at tidewater: Angles, 3 to 6 inches x ¼ inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; flange, 1.84½c; marine boiler, 2.41½c; refined iron bars, 1.54½c to 1.64½c; soft steel bars, 1.64½c; sheets, No. 28 black, 2.50c.

Old Materials.—There is undoubtedly a little more activity in all lines of scrap. Consumers show slightly more disposition to buy. Prices are, however, still weak. Heavy melting steel and heavy cast are receiving the most attention, apparently showing the influence of the improvement in the pig iron market. The only sales of note reported during the week involved about 700 tons of heavy melting steel scrap. The demand for strictly scrap rails seems to be improving, but offerings are not heavy or numerous. The demand for cast scrap improves steadily, although there has as yet been no noticeable change in prices. The following are prices approximately f. o. b. tidewater:

Old iron rails	$20.00 to 21.00
Old steel rails, long lengths	14.50 to 15.00
Old steel rails, short pieces	14.00 to 14.50
Relaying rails	25.00 to 26.00
Old car wheels	15.50 to 16.00
Old iron car axles	25.00 to 26.00
Old steel car axles	18.00 to 19.00
Heavy melting steel scrap	14.00 to 14.50
No. 1 railroad wrought scrap	16.00 to 16.50
Iron track scrap	14.50 to 15.00
Wrought pipe	12.50 to 13.50
Cast borings	9.00 to 9.50
Wrought turnings	11.50 to 12.00

CHICAGO.

Conditions Thoroughly Sound.—Heavy Buying of Pig Iron.

Office of THE IRON TRADE REVIEW, 1162 Monadnock Block, July 24

Conditions in this market have not been better in years. There have been times when orders had piled up in larger quantities, when buyers both ordered and specified far beyond the tonnage they actually expected to consume, but for both volume and genuineness the present market surpasses anything known for a long time, if ever. There is not a shadow of speculation in the present buying. Every ton ordered by a consumer has a definite place in view and in most cases the material is going directly into consumption. During April, May and June there was some backwardness in the placing of orders. That has disappeared during the month now closing and in almost all products the users and jobbers are arranging for their material during the ensuing month. There is a temperateness to even this change from inactivity to activity. The purchasers are not as a class clambering over each other and loading up with enough iron and steel to supply their needs for a year ahead, but sometimes for only three months, though oftener for six. In pig iron this forward business has been getting into 1907 deliveries and in rails and track supplies, where the conditions are of course special, current transactions have reference mainly to remote wants. But for bars, plates, sheets and finished products there has been an orderliness and restraint to the trading which promises much for the future. With bountiful crops now assured and all general business conditions almost ideal, there is no check or hindrance to the liberal placing of orders for metal material and moreover the ability of the mills to ordinarily make reasonably prompt deliveries removes any incentive to over-buy or to

speculate. Buying of spikes and other track supplies has been a feature this week, at least 100,000 kegs of spikes, or 10,000 tons, having been bought in this market. In lots of 5,000 tons and less some additional contracts for steel rails have been closed, one for 5,000 tons going to a Milwaukee inter-urban electric line for 1907 delivery. The contract for another lake freighter was let this week which gives 3,000 tons of steel plates to the Illinois Steel Co.

Pig Iron.—More than 50,000 tons of pig iron have been bought in Chicago during the past week. This follows the closing of the 25,000-ton order by the International Harvester Co., noted last week. The largest purchaser was the Griffin Wheel Co., but there have been also generous purchases of malleable iron, largely for shipments the first half of 1907. Spot iron is still scarce and commands some premium. It has been quite common for furnace interests to decline proffered business both for spot shipment and for deliveries extending through the next three or six months. Large melters of iron, who usually keep in stock a certain tonnage as a reserve against unexpected emergencies allowed those reserves to become exhausted in June, when negotiations for iron were in an acute stage, and have ever since been more or less embarrassed in consequence. Considerable iron has been shipped in to relieve this partial famine, but the demand is still excessive. Much the same conditions exist for deliveries running through the remainder of the year. Some of the leading producers have practically withdrawn from the market up to Jan. 1. This has strengthened the market. One southern maker is now quoting $14.50, Birmingham, for No. 2. The largest southern interest is asking $14, Birmingham, as a minimum, and has moreover withdrawn from active participation in the market. There are other southern producers, from whom iron is still procurable in moderate tonnages at $13.75 and for standard brands that is believed to be the minimum quotation this week. One or two furnaces, the products of which are reputed to be off-grade, are still sold at $13.50. Northern irons also have strengthened. Makers who last week were asking $18.50 as a minimum now quote $18.75 to $19. There has been quite a fair trading in local foundry irons for the first half of 1907 in lots of 500 to 3,000 tons. The entire list has visibly strengthened and revised quotations are as follows:

Lake Superior charcoal	$19.00 to 19.50
Northern Foundry No. 1	19.00 to 19.50
Northern Foundry No. 2	18.50 to 19.00
Northern Foundry No. 3	18.00 to 18.50
Northern Scotch Foundry	18.75 to 19.25
Ohio Strong Softeners No. 1	18.80
Ohio Strong Softeners No. 2	18.30
Southern Foundry No. 1	18.15 to 18.40
Southern Foundry No. 2	17.65 to 17.90
Southern Foundry No. 3	17.15 to 17.40
Southern Foundry No. 4	16.65 to 16.90
Southern No. 1 Soft	18.15 to 18.40
Southern No. 2 Soft	17.65 to 17.90
Southern Gray Forge	15.90 to 16.15
Southern Mottled	15.65 to 15.90
Southern Silveries (4 percent to 6 percent Silicon)	17.90 to 18.40
Jackson Co. Silveries, 8 to 10 percent Silicon	23.30
Alabama and Georgia Car Wheel	24.40 to 24.90
Malleable Bessemer	18.50 to 18.80
Standard Bessemer	19.30
Basic Iron	18.85

Billets.—There is an inquiry for 2,000 tons of high grade billets. Eastern sellers are unyielding in their quotations. Forging billets sell at $35 Chicago; wire rods, $36 Chicago, and sheet bars, $29 Pittsburg.

Iron and Steel Bars.—One of the eastern mills is now asking $2 premium on steel bars. This company usually takes the initial action in that respect and its action is not typical of the general market. But there have been quite free specifications of steel bars of late and some of the mills are getting farther behind in their deliveries. In iron bars the situation is somewhat akin to that in pig iron. Users held off for several months, anticipating some yielding of prices. This not occuring, they have lately been buying considerably in excess of the capacity of the mills to produce and the order books of the mills are filling up. There has been fair buying during the past week, a continuance of the improved trade which began about July 1. Mill prices, Chicago delivery, are as follows:

Bar iron, 1.66½c; soft steel bars and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.06½c base, full extras; old rail stock, 1.65½c. Jobbers report a good demand from stock, with prices firm. We quote bar iron, 2.10c, full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $1.85 to $1.95 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Sheets.—Basing their expectations upon the briskness of current inquiry, some selling interests are anticipating greater strength to appear soon in sheets. The demand is heavy and orders are filled with extreme difficulty by many makers. Mill quotations, Chicago delivery, are as follows:

Nos. 8, 9 and 10, 1.96½c; Nos. 11 and 12, 2.01½c; Nos. 13 and 14, 2.06½c; Nos. 15 and 16, 2.16½c; box annealed; Nos. 18 and 20, 2.36½c; Nos. 22 and 24, 2.46½c; No. 26, 2.51½c; No. 27, 2.56½c; No. 28, 2.66½c; No. 29, 2.81½c; No. 30, 2.91½c. Jobbers' prices on less than carload lots from store are as follows: No. 10, 2.20c; No. 12, 2.25c; No. 14, 2.30c; No. 16, 2.40c; Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.70c; No. 26, 2.75c; No. 27, 2.80c; No. 28 2.85c; No. 30, 3.30c.

Galvanized sheets, mill shipments, are as follows: Nos. 10 and 11, 2.56½c to 2.61½c; Nos. 17 and 21, 2.91½c to 2.96½c; Nos. 22 and 24, 3.06½c to 3.11½c; Nos. 25 and 26, 3.26½c to 3.31½c; No. 27, 3.46½c to 3.51½c; No. 28, 3.71½c to 3.76½c; No. 29, 3.91½c to 3.96½c; No. 30, 4.16½c to 4.21½c. From store, prices on less than carload lots are as follows: Nos. 10 to 20, 3.10c to 3.20c; Nos. 22 and 24, 3.25c to 3.35c; No. 26, 3.45c to 3.55c; No. 27, 3.65c to 3.75c; No. 28, 3.85c to 3.95c; No. 30, 5.05c to 5.15c.

Plates.—The plate mills are steadily improving the state of their order books. A 3,000-ton order for an additional lake boat went to the local mill this week and there are accessions in new business from all branches of the consumptive trade. Prices are strong, mill shipments, Chicago delivery, being quoted as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. We quote from local stocks: tank steel ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches to 96 inches wide, 2.10c to 2.20c; 3-16-inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Structural Steel.—Bridge work by the railroad companies is one of the more conspicuous features of structural material. Orders for several thousand tons have been placed during the past week, usually in small to moderate lots. Orders of this class taken by the American Bridge Co., include 450 tons from the Northwestern road, 325 tons from the Copper Range Ry. and 175 tons from the Chicago Junction road. Orders were booked by the same company for 525 tons for two small structures at the Gary steel plant. Prices are without change, mill shipments, Chicago delivery, being quoted as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, on one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work.

Quotations on lots from store are as follows: All angles three inches and larger, including six inches, $2.25 per 100 pounds base; angles over six inches, $2.35 per 100 pounds base; tees, three inches and larger, $2.30 per 100 pounds base; beams, three inches to fifteen inches, inclusive, $2.25 per 100 pounds base; beams, eighteen inches and larger, $2.35 per 100 pounds base; channels, three inches and larger, $2.25 per 100 pounds base.

Rails and Track Supplies.—Fair inquiry exists for steel rails in lots up to 5,000 tons and about 10,000 tons have been bought, including 5,000 tons for a Wisconsin electric railway for late 1907 delivery. The trading in track supplies for next year has been very heavy and for shipment in September or October this year premiums of $2 or more per ton are offered. Quotations are as follows:

Standard sections f. o. b. mill, open hearth rails, $29; Bessemer, $28; light rails, Bessemer steel, 30 to 45-pound sections, $28.50; 25-pound, $29.50, 20-pound, $30.50; 16-pound, $31.50; 12-pound, $32.50, and lighter sections down to eight pounds, $29.50 to $41.50, all f. o. b. mill. Track supplies are quoted as follows: Angle bars, 1.50c to 1.75c; spikes (for quick shipment), 2.15c to 2.25c; for forward deliveries, 2c; track bolts (for quick shipment), 2.65c to 2.75c base; square nuts (for forward deliveries), 2.50c.

Merchant Steel.—For special forms of steel, makers are still in the market, but for the more common products, some mills are well sold ahead and are not actively soliciting trade. The consumption is heavy and prices without change, mill shipment, Chicago delivery, being quoted as follows:

Planished or smooth finished tire steel, 1.86½c; iron finish, up to 1½ x ½inch, 1.81½c; iron finish, 1½ x 1½ inch and larger, 1.66½c, base; channels for solid rubber tires, ¾ to 1 inch, 2.16½c and 1⅛ inch and larger, 2.06½c; smooth finished machinery steel,, 1.91½c; flat sleigh shoe, 1.71½c; concave and convex sleigh shoe, 1.96½c; cutter shoe, 2.35c; toe calk steel, 2.21⅛c; railway spring, 1.86½c; crucible tool steel, 6½c to 8c, and still higher prices are asked on special grades. Shafting, 50 per cent off in car lots and 45 per cent in less than car lots, in base territory.

Boiler Tubes.—The volume of trade for this season of the year is exceptionally large and prices are firm at the following quotations:

	Steel	Iron	Seamless
1 to 1¼ inches	46.35	43.35	53.35
1¼ to 2¼ inches	58.35	43.35	40.35
2¼ inches	60.35	48.35	43.35
2¼ to 3 inches	08.35	55.35	
2¾ to 4½ inches (Seamless)			50.85
6 to 13 inches	58.35	43.35	

Less than carload lots, from store, as follows:

	Steel	Iron	Seamless Steel
1 to 1¼ inches inclusive	40	35	42½
1¼ to 2¼ inches, inclusive	50	35	35
2¼ inches, inclusive	52½	35	30
2¾ to 5 inches, inclusive	60	47½	42½

Merchant Pipe.—So heavy has the aggregate business in merchant pipe been during July that it has naturally raised the query whether jobbers are anticipating their usual autumn wants or whether the material is going directly into consumption. It is thought that both conditions exist to some degree and that there will be an expansion during the autumn months from the very brisk summer trade now in progress. Prices are firmer.

We quote, on the base sizes, ¾ to 6-inch black steel pipe, 79.35 per cent discount, and 69.35 Chicago for galvanized pipe. Quotations on material from stock remain at 76 to 77 per cent discount on the base sizes ¾ to 6-inch black steel pipe.

Cast Iron Pipe.—The Cleveland, O., municipal award for 3,000 tons was obtained by the United States Cast Iron Pipe & Foundry Co. The municipal inquiry for from 3,000 to 5,000 tons—the annual requirements—at Kansas City, Mo., is up for consideration today (Tuesday). In smaller lots there has been considerable tonnage placed. Prices are firmer, the following being said to represent absolute bottom, with advances paid in many instances: We quote, four-inch water pipe, $32.50; six and eight-inch pipe, $31; 10-inch and larger, $30; gas pipe, $1 extra.

Wire Products.—The fact that stocks in the hands of jobbers and dealers are now reputed to be quite low is held to be an augury for a splendid autumn trade. The July business from mill surpasses that of any previous July in recent years. Prices are firm but unchanged, quotations to jobbers, mill shipment, for Chicago delivery being as follows.

Wire nails, $2; painted barbed wire, $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Coke.—There is continued good demand for the better grades of foundry coke and Connellsville foundry is now commonly quoted at $3, ovens, or $5.65 Chicago. Occasionally prices for West Virginia grades are demoralized by the arrival of some free coke, which, when demurrage accrues, is sacrificed. Solvay coke continues strong at $5.50.

Old Material.—The tone in the scrap market has decidedly improved during the past week. Prices may not be quotably higher, but there is either a growing scarcity among dealers, or the latter are not offering their holdings so freely. Several new railroad lists are out, the largest of which is that of the Baltimore & Ohio road for nearly 6,000 tons. The Burlington has a list of about 3,000 tons and the Santa Fe one for a smaller amount. There is an improvement in the demand for melting steel, the prices for which have hardened, if not advancing. Cast scrap also seems to be difficult to procure. Quotations are as follows, for gross tons in the first paragraph:

Old Steel Rails (4 feet and over)	$15.50 to 16 00
Old Steel Rails (less than 4 feet)	14.00 to 14 50
Old Car Wheels	18.00 to 18.25
Old Iron Rails	20 50 to 21.00
Relaying Rails, subject to inspection	27.00 to 27.50
Heavy Melting Steel	13.00 to 13.50
Mixed Country Steel	11.00 to 11.50

We quote net tons, as follows:

No. 1 R. R. Wrought	$13.50 to 13.75
No. 2 R. R. Wrought	12.50 to 12 75
Shafting	15.75 to 16 00
Dealers' Forge No. 1	11.25 to 11.50
Wrought Pipe and Flues	9.25 to 9.50
No. 1 Cast, 150 pounds and less	13.00 to 13.50
No. 1 Mill	8.25 to 8.50
Mixed Busheling (No. 1 & No. 2)	8.50 to 9.00
Country Sheet	7.25 to 7.50
No. 1 Boilers Cut	9.00 to 9.50
Boiler Punchings	11.00 to 11.50
Iron Car Axles	22.50 to 23.00
Steel Car Axles	17.50 to 18.00
Iron Axle Turnings	9.25 to 9.50
Cast Borings	7.00 to 7.25
Mixed Borings, etc.	7.00 to 7.50
Machine Shop Turnings	8.75 to 9.00
Railroad Malleable	12.50 to 13.00
Agricultural Malleable	12.50 to 13.00
Stove Plate and Light Cast Scrap	11.00 to 11.50
Old Iron Splice Bars	16.00 to 16.50

ST. LOUIS.

Pig Iron Very Strong.—Many New Buildings Being Erected.

July 30.

Pig Iron.—Pig iron continues to advance steadily and all dealers agree that it will go higher before it goes lower. Demands are lively, but few furnaces have any pig for immediate delivery for sale. The prevailing price is $14.00 for southern No. 2, Birmingham basis, with a few spot sales quoted at $14.50. One order of 200 tons for delivery to a foundry in Iowa was booked at $14.50 for delivery in thirty days. Another order of 2,000 tons Missouri basic iron calls for $18.50.

This time one year ago southern No. 2 was selling at $14.50 in St. Louis and the market was weak. The remarkable era of prosperity through which the iron industry has been passing, is due, the dealers say, to the unprecedented demand for construction material by contractors. Never in its history has St. Louis had

so vigorous and consistent a building boom. At this time no less than seven steel frame buildings are in course of construction and several more are being projected.

The result of this unusual demand has been that the majority of St. Louis pig iron dealers have sold out. The Chattanooga is completely sold up; the Trussville will not be in blast before August 15, and practically all the available iron in the Birmingham district has been contracted for. The St. Louis dealer who is able to make figures for delivery within thirty days is indeed fortunate. The pig iron market is stronger right now than it has been in years and shows every prospect of continuing to climb. Quotations, including the freight rate of $3.50 to East St. Louis, range as follows:

Southern No. 1	$18.00 to 18.50
Southern No. 2	17.50 to 18.00
Southern No. 3	17.00 to 17.50
Southern No. 4	16.75 to 17.25
Gray Forge	16.50 to 17.00

Coke.—The market is strong and climbing. Demand is brisk and about 5,000 tons have been sold. Connellsville and Virginia 72-hour foundry are quoted at $6.05 to $6.30 f. o. b. for immediate and future delivery. Labor troubles throughout the southern coke fields are cited as the chief cause for the strength of the market.

New Material. — The settlement of the local labor troubles has greatly improved the general status of the trade in structural material and dealers report that the prospects are for an excellent midsummer and fall business. All the different local foundries are now able to go ahead with their work and fulfill contracts which, in some cases, had accumulated enormously and the continuance of the unusual building boom here should keep things lively for months to come. The revival of activity in the merchant bar business in this market is regarded as a forerunner of a similar movement along all lines.

Metal Market

NEW YORK.

July 30.

Pig Tin.—Buying has been spasmodic, but at the close the market is quiet. The following are today's quotations. Spot, 37.20 to 37.50; August, 37.20 to 37.50; Sept., 37 to 37.50; London, £171 and £171 10s. Arrivals for the month to date, 3,073 tons; afloat, 1,357.

Copper.—The demand seems to have been checked but prices remain fairly steady. Today's quotations: Lake, 18½ to 15⅝; electrolytic, 18¼ to 18⅜; casting, 18 to 18½; London, £83 5s and £82 5s. Exports for the month to date, 15,225.

Lead.—Refined lead has been a little firmer but closes dull. Today's closings, 5.75; St. Louis, 5.65; London, £16 15s.

Spelter. — The market has been quiet and barely steady. Today's quotations: 5.95 to 6.05; St. Louis, 5.92½. London, £26 15s.

Antimony.—Antimony is weak and nominal. At today's close Cookson's is held at 23c to 24c; Hallet's, 23c asked; other grades, 21c to 22c.

ST. LOUIS.

July 30.

After last week's brisk trading in lead and spelter the market settled down to quiet and there was little activity at any time. Despite the fact that lead ore was advanced from $1 to $3 a ton over last week's figures in the Joplin district, lead held nominal at $5.65 for Missouri brands. The cause of ore being advanced is the increased demand by the Galena smelter, while the St. Louis Smelting & Refining Co. remains in the lead for the quantity purchased. Spelter held firm all week on an advance of from 50c to $1 a ton on zinc ore. The principal producers asked $6, but only $5.92½ was bid.

CHICAGO.

July 31.

Users of copper became deeply interested in the market late last week, owing to an advance of an eighth of a cent on all grades. But the interest subsided almost as quickly as it arose and trading has since resumed its normal proportions, production and consumption apparently running side by side.

Lake copper is now quoted at 18⅝c to 18¾c; electrolytic, 18½c to 18¾c, and casting, 18c to 18¼c. Pig tin, car lots, 38c to 38½c; pig lead, desilverized, 6c to 6.10c for 50 ton lots; corroding, 6.50c to 6.55c for 50 ton lots; sheet zinc, $7.75 list f. o. b. LaSalle in car lots of 60-lb. casks; spelter, prompt delivery, 6.10c to 6.15c; Cookson's antimony, 25c; other grades, 23c to 24c; nickel, 47c for round lots, and 50c to 60c for smaller.

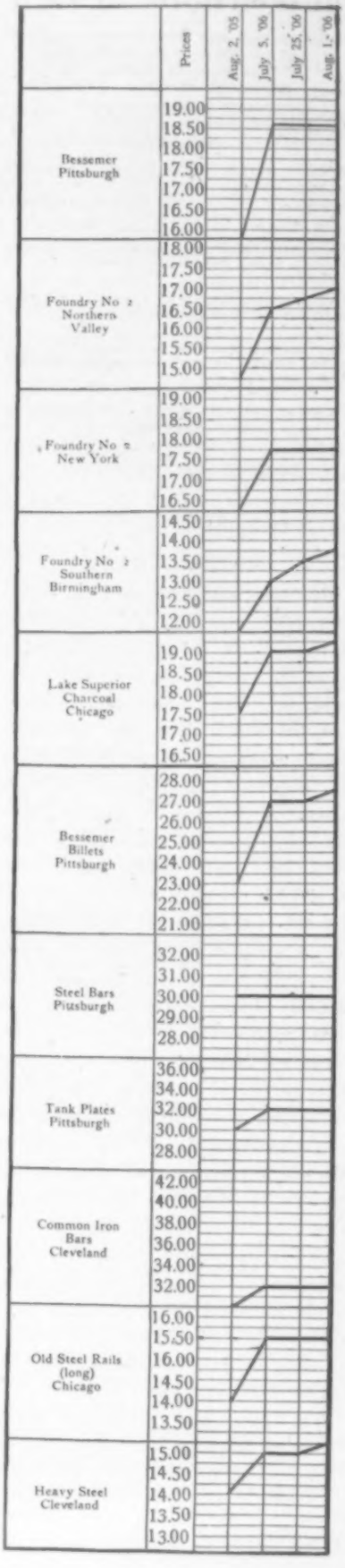
On old metals we quote, copper wire, 16¾c; heavy copper, 16½c; copper bottoms, 16¼c; copper clips, 16c; red brass, 16c; red brass borings, 14¼c; yellow brass, 12¾c; yellow brass borings, 10¾c; light brass, 9½c; lead pipe, 5¾c; zinc, 5c; pewter, No. 1, 24c.

LATE RAIL SALES.

(Special Telegram.)

New York, August 1.—Rail sales are announced as follows: Buffalo, Lockport & Rochester, 6,000 tons for 1907 delivery; miscellaneous trolleys, etc., 6,000 for this year. Pennsylvania road has allotted 35,000 tons of total previously reported.

PRICE CHART.



THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades.

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ANNOUNCEMENT.

With this issue THE IRON TRADE REVIEW takes over *The Iron and Machinery World*, of Chicago, including all of its subscription and advertising contracts. The journal thus absorbed was the oldest iron and machinery paper published in the west, being the outgrowth of *The Age of Steel*, founded in St. Louis in 1857, and *Iron and Steel*, founded in Chicago in 1862. With the large increase in expense involved in the publication of a journal devoted to the iron and steel business, necessitating the employment of many competent men in both the news and business departments, the number of such publications is necessarily reduced to those who best serve their patrons and the idea once prevalent of having many local organs is no longer entertained. The national journal which represents all parts of the country is the one which survives. THE IRON TRADE REVIEW feels no hesitancy in promising subscribers and advertisers of *The Iron and Machinery World* entirely satisfactory service.

The Iron and Machinery World in its issue of July 28 publishes the following announcement:

"*The Iron and Machinery World* will from this date be merged in THE IRON TRADE REVIEW, having been purchased by the Penton Publishing Company of Cleveland for that purpose. Advertisers and subscribers are requested to continue the patronage heretofore extended to this journal, to THE IRON TRADE REVIEW, which has acquired a world-wide reputation for enterprise and accuracy. It now occupies the great field and fills the demand so creditably and satisfactorily that there is not room for another in the same line. In extending our thanks to subscribers and advertisers, we beg to assure them that THE IRON TRADE REVIEW can and will give them greater returns for their money. This statement is based upon careful investigation and knowledge. In relinquishing the further publication of *The Iron and Machinery World*, there is a measure of satisfaction in the fact that it becomes merged into a journal of such exceptionally high standing and able management."

MURDERERS ACQUITTED.

The verdict of Coroner Acritelli in the inquest into the killing of the special policeman, Michael Butler, at the new Plaza hotel, New York, by a gang of union murderers was one of the most outrageous miscarriages of justice ever recorded in this country. The evidence was perfectly plain. According to medical testimony, Butler's mind for some time before his death was perfectly clear, and he positively identified four of his assailants after looking them over carefully. Michael O'Toole, another watchman who was assaulted, described how the gang attacked Butler, and how he narrowly escaped a similar fate. The coroner was evidently in sympathy with the murderers and his jury returned a verdict that death was caused by an accidental fall and added, "We exonerate the defendants."

If the action of the jury were final, there would, indeed, be very little hope of checking the murderous proceedings of labor unions in New York, but fortunately the case is to be investigated by the grand jury, and under instructions from the district attorney, four of the accused men have been held. It is difficult to understand how a grand jury can fail to indict for murder, and it is certainly time to put a stop to the career of crime of structural iron workers in the metropolis. Since the days of Sam Parks, and his "entertainment committee" the city has many times been disgraced by acts of violence, and the murder of a watchman who was assaulted and then thrown down several floors in a building in the course of construction, came as the crowning act of men who seem to think it is no crime to kill those who do not belong to their labor union.

TO PERFECT THE CONSULAR SERVICE.

As long as Theodore Roosevelt occupies the presidential chair it may confidently be expected that all which an executive can do will be done to abolish the spoils system in the consular service, but fortunately the country cannot depend upon always having a president so thoroughly in favor of the merit system as is the present occupant of the White House. For a number of years efforts have been made to have congress pass a bill which would completely divorce the spoils system and the consular service. There has been persistent opposition, but at the last session the house and senate passed the bill framed by Secretary Root and Senator Lodge, which provides for a decided bettering of consular conditions. The bill was amended, however, so that all the features advocated by the friends of civil service reform were not included.

The National Business League, through whose efforts much has been done in the way of consular reform, is now advocating a supplemental bill which aims to establish a comprehensive system for the transfer of officials from one post and one grade to another; to provide tenure of office, contingent upon efficiency only; to require familiarity on the part of consuls with one modern language other than English, and to demand a knowledge of the natural, industrial and commercial resources of the United States on the part of those applying for admission to the consular service. These are all sound provisions which ought to be put into permanent law. At present, owing to the fact that President Roosevelt and Secretary Root believe in the merit system, much that is included in the new bill is provided for by special executive orders. The object in passing the bill is to make the provisions

permanent, so that they cannot be changed by executive orders. Business men everywhere, and especially those engaged in the export trade, are urged to use their influence with their congressmen in support of this excellent measure. THE IRON TRADE REVIEW hopes that members of the house and senate will be given emphatically to understand that the business sentiment of the country demands greater efficiency in the consular service, especially the elimination of the professional office seeker from the country's service in foreign lands.

THE NEW SOURCE OF POWER.

A source of power which is ten years old would not customarily be considered a new thing as improvements go in American iron and steel works, but in this instance the age has been attained abroad, where Americans are wont to consider that improvements are made much more slowly than in the United States, and the age in this country is but a fraction of ten years, so that whichever way one looks at it, the use of blast furnace gas in large gas engines is a new thing. It is barely ten years ago that gas engines using blast furnace gas were put into commercial use almost simultaneously in Great Britain, Germany and Belgium.

It is only in keeping with the high standard of the Iron and Steel Institute that, at its Jly meeting in London, valuable and exhaustive papers should be brought forth on this very important subject. Separate papers were presented, dealing with England, Germany and Belgium. The United States was conspicuous by its absence. It is with a shock that one learns from the German paper that there are built or ordered, for German blast furnaces and coking plants, a total of 380 gas engines, with an aggregate rating of 421,150 horsepower. The report does not separate, probably because it was inconvenient if not impossible to do so, the engines using blast furnace gas from those using coke oven gas, but it is evident that the great bulk of this power is to be produced by blast furnace gas.

Nor is there any inference regarding the proportion of the total blast furnace gas in Germany, left after the stoves have been supplied, which is engaged for power production through gas engines. It is possible, however, to gain an idea. Based upon the best practice likely to be attained in the United States, H. H. Campbell computes that a 300-ton blast furnace can have gas to spare equivalent to the generation of 4,200 horsepower. On this basis Germany's 421,150 horsepower of gas engines would represent the annual production of 10,980,000 gross tons of pig iron, which lies between the country's production last year and its prospective production this year. Campbell's estimate was based upon a furnace using 1,600 pounds of coke per ton of pig iron, and a ratio of CO to CO_2 of 1.5. The small proportion of carbonic oxide was taken to represent the possible general attainment in the future, rather than the average of present practice. For this reason, and considering the leaner ores smelted in Germany, as well as allowing for the fact that some of the German gas engine power referred to is to be developed with gas produced in coking, it is certain that the German engines built and building will not consume all the gas produced by the country's blast furnaces, but it is also probable that the proportion is not far from one-half. At the present rate of gas engine installation the proportion is rapidly increasing. Indeed, the paper quoted shows that from March 1 to July 1 of this year German works ordered 31 engines rated at 36,150 horsepower, so that the total of 421,150 horsepower could be installed in four years at the present rate of development.

The blast furnace gas engine is well represented in England and Belgium, according to the Institute papers referred to, but to a far less extent than in Germany. The United States was not represented, and is obviously far behind Germany. The plans of the Lackawanna Steel Co. contemplated three separate power plants, with a total of about 33,000 horsepower. As noted in these columns last week, the Indiana Steel Co. has given an initial order, for the new Gary plant, for 24,000 horsepower of blast furnace gas engines, making a total in the United States, including minor plants, less than one-sixth that of Germany.

The time has passed in the United States when cheapness of fuel could be given as an excuse or reason for the non-adoption of fuel saving arrangements. Fuel is not nearly as cheap as it was and the old days are not likely to return. Besides, a penny saved is a penny earned. The gas engine at blast furnaces must be adopted by those who expect to stay in the front. The blast furnace cannot be so worked that it will not give off a fuel gas. As carbonic acid will form carbonic oxide in the presence of coke at all temperatures above 1,020° Fahr., a certain proportion of the carbonic acid formed by the reactions in the lower part of the furnace and of that formed by the dissociation of the limestone is necessarily converted into carbonic oxide. This proportion can be reduced only to a certain point, and when that point is reached there is still enough calorific value in the tunnel head gases to give one-third of the total to the stoves and still leave two-thirds, amounting to 4,200 horsepower in a 300-ton furnace, provided a gas engine be used. The gas engine in this connection is at least twice as efficient as a steam boiler and engine. A total of 1,500 horsepower may be taken as required to blow such a furnace, leaving 2,700 horsepower for the minor purposes about the blast furnace plant, and for the attached steel works and rolling mill. It has been estimated by various competent authorities that by using gas engines the blast furnace will develop enough power to run itself and the attached steel works and rolling mills, to carry the rolling through such forms as billets, rails, and similar forms not too finely finished.

The adoption of gas engines to use blast furnace gas will doubtless proceed rapidly in the United States, now that a good start has been made. There is another field. Abroad, the gas produced in coking operations is being used to an extent. That must be done in the United States. The return of coke production in the United States in 1905 showed 10.74 per cent of the

coke made in by-product ovens. The year 1905 was a record year for coke production; so, in its time, was 1902, and that year showed just half as large a percentage of by-product coke. Owing to various compelling conditions the production of retort coke is bound to increase rapidly and with this increase will come gas which must be used. When all the power required for the complete operation of blast furnace, steel works and rolling mill has been found, and there is blast furnace and coking gas to spare, power must be supplied to outsiders, or the gas must be adopted in the heating furnaces. Already a project is being carried out in England where the principal objects are the recovery of the by-products and the furnishing of gas to open-hearth steel furnaces, the owners of several steel plants having confidence enough in the gas to make long time contracts for it. The ideal condition will be when not a pound of raw coal enters into iron and steel processes, either for power generation or for heating, and that condition is likely to be reached in the not distant future in the most progressive operations.

Standard Chain Plant Burned.—The forge shop of the Standard Chain Co., at St. Marys, O., was totally destroyed by fire on Saturday, July 21. The building was a brick structure 54 x 200 feet. The loss is estimated at $35,000 to $40,000, nearly covered by insurance. The engine, boiler, power-house, polishing room and warehouse as well as the finished stock were saved. The fire is of unknown origin. Owing to the break of the gas pipes, the destruction of the building in which the fire was confined was total. The Standard Chain Co., by reason of the fact that it operates a number of plants located in other cities, was in a position to reduce the loss to a minimum. It immediately transferred a number of its chainmakers from the St. Marys plant to Pittsburg and Marion, Ind., where the company has other plants in operation. A vacant machine shop was leased by the Standard Chain Co. and equipped with the necessary machinery transferred from its other plants and within one week from the date of the fire, this new and temporary plant was in full operation, working double turn. Consequently no serious delay will be caused to any shipments of customers. As soon as insurance on the loss has been adjusted, the plant at St. Marys will be rebuilt on a much larger scale.

News From the Strike Centers.

Important changes have followed the decision of the Chicago branch of the National Foundrymen's Association to stand for the open shop and resist the demands made by the union leading up to the strike declaration of May 1. Splendid progress is being made in operating the struck shops. About the middle of May some twenty foundries formed the Chicago branch, adopted a constitution and by-laws and elected officers, and immediately a substantial beginning was made to operate the foundries. Apprentices, handy men and helpers were placed at work; superintendents and foremen acting as instructors, and the nucleus of a new force was speedily developed. From that day to this, by the most untiring efforts and persistent work, capable men have been advanced and molders and coremakers from other points have been brought to Chicago, to assist in operating the foundries, on the one basis, absolute freedom of employment. The results have proven most gratifying and the general average, at this writing, of the production in the foundries of the branch members will run between 65 and 70 per cent.

One important factor which has materially aided this showing is the large increase in the number of molding machines installed and now doing good work. There never will be a time in the future when there will be positions for as many molders as have previously been employed in that city. New methods of production have come to stay and increased output, man per man, bears indisputable testimony to the limitation of a day's work which the union had previously practiced.

Strikers May Ignore Order.

Members of the Housesmith's and Bridgemen's union of New York threaten to ignore the order of the International Association of Bridge and Structural Ironworkers calling off the strike against members of the National Association of Erectors of Structural Iron and Steel, and continue to attempt to hold up work on a number of important jobs. The members of the allied iron associations, anticipating action on the part of the union men, enclosed a copy of the following notice in the pay envelope of each of their present employes.

"The Housesmiths and Bridgemen's union has voted to work for members of this association in open shop, and its members are applying for work on many of our jobs. We intend to be loyal to the employes who have stayed with us in this strike. Wherever union men are employed they will be taken on every job in small and limited numbers, and because of the scarcity of men and not to replace any of our present men. Those who accept employment from us merely for the opportunity to continue to injure us or you by threats or by 'accidents' or by promoting dissatisfaction among our men are deserving of no consideration from you or from us. You will oblige us by reporting at our bureau any case of the kind, and it will be promptly dealt with. We wish again to assure you that we will not recognize in any way any union, old or new."

An "Accidental" Murder.

Coroner Aoritelli at the inquest inquiring into the cause of death of Michael Butler, the watchman who was killed by a fall from the staging in the framework of the Plaza hotel last week during an assault upon him and two companions by union workmen, held that the attacking party even while engaged in an assault with wrenches and bolts could not be held responsible for the fall. The jury, therefore, brought in a verdict that "death was caused by an accidental fall," and the jurors added, "We exonerate the defendants."

Four of the seven accused members of the union were immediately rearrested and indicted before the grand jury for felonious assault upon Michael O'Toole, one of the special policemen with Butler and Cullen on the Plaza Hotel when Butler was killed. The grand jury promptly returned indictments and the men were arraigned before Recorder Goff. All pleaded not guilty. With the exception of one, released on bail, they all were returned to the tombs.

Buffalo Situation Improves.

Foundrymen report an improved condition in the Buffalo district and several more foundries have secured the normal number of men. One plant is operating with 80 per cent of its normal quota, but the management feels encouraged and expects a full force before another month passes.

An officer of the Buffalo Foundrymen's Association states that a number of men were turned away the past week and sent to help out other cities where strikes were hampering trade, there being no work in their particular line in Buffalo. Most of the vacancies left by strikers of the Molders' Union, which were not filled by practical men from other cities and those who gave up the local union, have been filled with young men whom the employers

hope will learn the trade. They were given positions, many of them receiving higher wages than they received in other vocations, in hopes that they could be educated to become practical men. Great care is observed in the selection of these men, only those being taken who are likely to be useful in future work. They have been assured good wages.

This step was taken largely as an experiment, the foundrymen hoping to protect themselves against further tie-ups by union troubles. Now they are about ready to report the experiment a success. The young men now appear to be ambitious and do their work with a care resulting in few defective castings. One firm reports a higher percentage of perfect work than it attained under its previous organization.

Practically all the work of replacing striking molders has been done under police protection and the Buffalo Foundrymen's Association is gratified with the ample security to life and property provided them by the department of police.

Labor Notes.

New indictments have been returned by the grand jury at Chicago against Cornelius P. Shea, president of the International Brotherhood of Teamsters, and 42 other labor leaders and officials, of whom 31 were indicted with Shea a year ago.

About 200 men are idle at the plant of the Canton Iron & Steel Co., bar iron manufacturer of Baltimore. The strike was due to the refusal to grant the demanded advance.

Robert H. Jeffrey, vice president of the Jeffrey Mfg. Co., Columbus, O., who has been very active in fighting the strike of molders in that city, had occasion last week to distribute cigars in celebration of the arrival of a daughter at his home. The strikers were not overlooked. They immediately called a mass meteing at which resolutions of thanks were adopted.

About 200 men at the Harrison, N. J., works of the Crucible Steel Co., struck July 23 when the demand for a ten per cent increase in wages was refused.

The molders at the Pratt & Whitney factory, Hartford, Conn., struck July 24 for a minimum $3 wage, recognition of the union, and abolition of the piece-work system.

The annual convention of the National Founders' Association will be held at New York, Wednesday and Thursday, Nov. 14 and 15. The regular session will be preceded by the meetings of the administrative council on Monday and Tuesday and by the "alumni" dinner on Tuesday evening.

WHIGHAM TAKES CHARGE OF LONDON OFFICE.

H. T. Whigham, assistant to President J. A. Farrell of the United States Steel Products Export Co., has been appointed manager of the London office of the company, succeeding Col. Millard Hunsicker, resigned. He sailed for Europe on the steamer Oceanica, July 18, and assumed the duties of his new position August 1.

The new foreign representative of the United States Steel Products Co., is a brother of William Whigham, assistant to President A. C. Dinkey of the Carnegie Steel Co. He is well qualified by training and experience for the position and the appointment is a mark of the confidence and esteem in which he is held by the officers of the export company. H. T. Whigham was born March 4, 1870, and was educated in the public schools and took a business course in Duff's college, Pittsburg. His first experience in the iron and steel business was with the Sharpsville furnace, Sharpsville, Pa., and later with the Buffalo Furnace Co., Buffalo, N. Y. He spent two years with the Trinidad Rolling Mill Co., Braddock, Pa., and was connected with the wire interests until the organization of the United States Steel Products Co., when he became assistant to President J. A. Farrell, having direct charge of the company's Canadian business in addition to other duties.

H. T. WHIGHAM.

Through the agency of the Employers' Association of Cleveland, two union labor sluggers were fined during the past week, one receiving $25 and costs and the other $10 and costs.

WILL BUILD LARGE PLANT.

Extensive improvements are under way at the plant of the American Seeding Machine Co., Richmond, Ind., which will double the capacity of the present plant. The Osborn Engineering Co. of Cleveland, will prepare the plans and specifications, and all contracts will be let within a few weeks. There are to be nine new buildings, all of which will be of mill construction, with the exception of the one-story structures which will be of steel. A complete new foundry will be built, 200 x 150 feet; a blacksmith shop, 215 x 93 feet; a pattern shop, 70 x 50 feet; a woodworking and painting building of four stories, 232 x 50 feet; an assembling and storage building, also of four stories, 50 x 20 feet; a grinding and sorting room, 195 x 35 feet; a dipping room, 50 x 35 feet; a coal-storage house, 35 x 35 feet and a coke-storage house, 75 x 30 feet. The plant, when finished, will cover two blocks. In fact, Fourteenth street has completely disappeared to furnish room to construct the foundry. In all, the plans call for 150,000 square feet of available floor space.

INLAND STEEL COMPANY EXTENSIONS.

(Special Telegram.)

Chicago, August 1.—The capital stock of the Inland Steel Co. was increased from $2,500,000 to $5,000,000 at the annual meeting held here yesterday. The Laura mine on the Mesabi range controlled by A. W. Thompson was also acquired and Mr. Thompson was elected a member of the board of directors. The company recently acquired fifty acres of land adjoining its property at Indiana Harbor, having a lake frontage of 4,000 feet. Two blast furnaces are to be erected and extensive additions will be made to the finishing capacity. Arthur G. McKee, mechanical engineer, Cleveland, is preparing the plans.

The Thompson Connellsville Coke Co. has let a contract for the erection of two plants of 400 ovens each near the Oriental and Republic works. One hundred ovens are to be built at each plant before the first of the year, and contracts have also been let for two shafts and for about three miles of railroad to connect with the Dunlap Creek branch of the Monongahela railroad. Officers of the company are: Charles Donnelly, of Pittsburg, president; A. A. Thompson, Uniontown, vice president and treasurer; J. P. Brennan, Scottdale, general manager, and W. G. Rock, Pittsburg, secretary.

HARD TO FIND

INDEPENDENTS SEARCHING FOR IRON ORE LANDS.

Meet with Difficulty.—Drying Sheds Enlarged.—Operations on Various Properties.

(Staff Correspondence.)

Office of THE IRON TRADE REVIEW. Duluth, July 28, 1906.

It is constantly becoming more evident that independent interests are going to be in sore need of ore in the near future. As it is, a number of independent concerns operating blast furnaces and steel mills are now entirely dependent upon the large operators for their ore and there is a constantly decreasing chance of escape from that position. Practically every piece of land of any mining value comes first of all to the notice of the big corporations, and one eastern steel company has been urgently in the field for a considerable length of time seeking ore land without being able to close a deal. The prices asked now for properties that have been on the market recently are undoubtedly high on the basis of present values of ore and to the interests which already have large holdings of ore lands would be unattractive for a long time to come, but for the independent fabricator and blast furnace company it is a question well worth considering as to whether he should not pay almost any price within reason to obtain his own ore lands. Drilling operations are being carried on all over the Mesabi and excepting where known deposits are being further investigated little of worth is being developed. Yet the inquiry for mining property was never much more insistent and urgent than at present and those who must go into the market for ore will do well to allow no little thing to stand in the way of obtaining control of their own ore lands.

Word has just been received that the shaft at the new Adriatic mine has been put down 75 feet into ore. This property is being managed by Joseph Sellwood and a half interest is held by Pickands, Mather & Co. The shaft is located in section 30, 59-14 and was sunk in marsh and quicksand, the water coming in at the rate of 1,000 gallons a minute and to sink it to the depth of 75 feet has taken from May 1.

The drying sheds at the Zenith Furnace Co., where the attempt was made to thaw the ore by running the cars into the shed which was heated by hot air blown through steam coils, have been enlarged. The capacity of the sheds heretofore was so limited that only a few cars could be heated at once, necessitating a rapid and intense heating which damaged the cars. Now more cars can be heated at a time and for a longer time, so that a less intense heat is required.

Tentative plans have been reported for the erection of a slag cement plant at West Duluth, using the slag from the Zenith furnace, but the details are not yet far enough advanced to warrant description.

Morris Mine.

Until this summer the area of the Morris mine from which ore was being taken out was but a small fraction of the extent of the ore body. The property as it has been stripped this spring is oval shaped with the long axis running east and west and the pit, which is about one-third the width of the stripped area, is a segment of that oval with the inner chord somewhat concave, extending along the north side. The old approach which is still being used runs up out of this pit on the north bank, but a new approach is nearly finished, which enters on the south side of the area just stripped this year and from which no ore has yet been taken.

Drake & Stratton have the stripping contract and have four steam shovels at work. With the exception of a V-shaped piece of ground that projects in from the eastern end, on the north side of which two shovels are now removing the over burden, the ore has been pretty well laid bare within the present limits of stripping. Of the other two stripping crews, one is finishing up the approach on the eastern end of the south bank and the other is working at the extreme western end. Three shovels are taking out ore and a fourth is used as a relay, each shovel in turn remaining idle long enough to be overhauled. The ore is all being taken out along the southern bank of the pit widening it out into the area just stripped and the shovels are located at intervals from one end of the pit to the other.

Capt. Alex. Murray gets out from twelve to fourteen thousand tons of ore every day of Pillsbury and Tubal grade. In June the Morris shipped in the neighborhood of 300,000 tons, making a total for the mine up to July 1, of about 500,000. At this rate the output this season will be 1,350,000 tons or about 300,000 tons more than last year, when the Morris was one of the eight mines on the Mesabi, producing more than a million tons. William McDowell is superintendent of the Morris mine.

The old boilers at the top of the pump shaft are in a woeful condition and the boiler house is a mere covering, so that the new brick boiler house, the foundation and side walls of which are nearly completed, was much needed. Two horizontal tubular boilers from the Hull mine are to be installed and have already arrived at the Morris. The breeching, which is to be furnished by the Gogebic Boiler Works of Duluth, was being expected at once when the new equipment would be set up. The pumps in the shaft are not only used for drainage but pump water for the location nearby. An electric power station is to be placed in one wing of the new building and the generators will be ready about Sept. 1. The location has already been wired in anticipation of the new plant.

Laura Mine.

The Laura mine is one of the departures to which Alexis Thompson has devoted himself since severing his connection with the Republic Iron & Steel Co. Together with J. A. Eaton and Wayne Wills he bought this property from the Winifred Iron Co., last year, retaining for the name of the new operating company that of the old company of which the controlling interest was A. M. Chisholm, of Duluth. Supt. William Wearne is still in control and Capt. Fred Erickson, formerly with the Oliver Iron Mining Co., is running the mine.

The Laura is not a large mine, shipping about 600 tons daily and employing from 60 to 70 men on a shift. It is about three years old and ships two grades of ore, Laura and Sharpsville. Laura ore runs from 50 per cent to 63 per cent and Sharpsville is stockpile ore which was accumulated to the amount of 42,000 tons during the winter, shipments of which have not been begun as yet.

At the Laura is shown a marked difference in the appearance of the old workings and the new, distinguishing the former control from the present. There are in all two old subs and then the old main level and below that two more subs and the bottom level. The upper subs are laid out very irregularly and have not been maintained in the best of condition, probably with good reason, but the old main level is in fairly good shape. The new levels are laid out much better and the ore is extracted by blasting and "slicing" from "square rooms" built according to the usual custom, and then milling the ore down to the bottom level. With the exception of a little water on the bottom level, the mine is very dry, so that though there are installed a No. 6, No. 9 and No. 10 Cameron

pumps only the No. 10 is in operation.

A somewhat novel condition at this property detracts largely from its value. Between the bottom sub and the main level below there is a 23-foot depth of taconite and below that there was a vein of ore just high enough to permit the drifting of the main level, for the floor of the main level is also taconite of the hardest variety. Had there been solid ore instead of the foot wall of taconite under the bottom sub, the Laura would be able to mine to much greater advantage.

The labor at this mine is all done by contract. In the soft ore in the upper levels the miners receive $1.50 per foot for drifting. For the lower raises, which are 8 feet by 8 feet instead of 6 x 6, as are the raises between the top subs, the miners receive $2.50 per foot and in the taconite it is necessary to pay $3.00 a foot. The lower plant is somewhat limited in size though ample for the mine's operations, and consists of twin 12 x 16-inch engines built by the Lake Shore Engine Works of Marquette, Mich. There are two boilers, the smaller one manufactured by the Keewanee, Ill., Boiler Works and the larger by the Milwaukee Boiler Works. The hoisting drum is five feet in diameter and geared to the engines.

The Susquehanna Mine.

The Susquehana mine shipped its first carload of ore just four weeks ago. The shaft was sunk three years ago, but after opening up one level, water in great quantities broke in at the beginning of drifting and flooded the mine. The workings stood idle then until July 14, 1905, it being feared by the owner, the Buffalo & Susquehanna Iron Co., that the property could not be operated because of water. Pumping was begun on that date, however, and after 18 days pumping at the rate of 1,700 gallons per minute, the water was successfully lowered. The pumps at that time consisted of a tandem triple expansion duplex Prescott pump, capacity 1,500 gallons a minute, three No. 10 Camerons and a 600-gallon Prescott. After the mine was cleared, for fear of an accident which might disable the 1,500-gallon pump, a contingency that would result in the mine being again flooded, a new and larger Prescott pump was installed at the foot of the new shaft and the old pump stationed at the bottom of the old shaft to be used in case of emergency.

The new pump is perhaps the most remarkable on the range, not only because of its capacity, 2,750 gallons per minute or about 4,000,000 gallons every 24 hours, but because of its design, being the only pump on the range having rotary steam valves and because of the excellent running record it has made. It has been in continuous operation night and day for 13 weeks, and has not been regulated on the average more than twice a day. The erection of the pump was also quite a feat, the parts, some of which weighed as much as five tons, having to be lowered through the old shaft and carted over to the pump house through the rather cramped passageways of the underground workings.

The new pump is like the old in design of the steam end save that the old pump has sliding steam valves instead of rotary. The water end is of the standard Mesabi type, with 15-inch plungers and 24-inch stroke. The pump has been adjusted by Master Mechanic Schaefer, however, to work with 25-inch stroke, which enables the same amount of water to be handled with the pump running slower. The steam cylinders are 15, 23 and 39 inches respectively and the pump itself is 26 feet long and 7 feet 6 inches high. The suction pipe is 17 inches in diameter and the discharge 14 inches, and the water is drained into a well 8 feet by 9 feet by 10 feet. The steam end is completely packed with non-conducting material and the pump house, which is now lined with boards, is to be lined with galvanized iron as a protection against fire. The old pumps are primed regularly each day in anticipation of an emergency. Steam is always kept on the 1,500 gallon pump and the piping and valves are arranged so that the other pumps can be started simultaneously with the opening of one main valve. There are also two steam lines from the boilers, one from the front header and one from the back and by connecting in by-passes between the two, a complete breakdown of the steam line has been made necessary before steam would be cut off from the pumps. The water is coming in at present in considerable quantities in a couple of drifts and much of the trouble appears to come from a single vein of water, for where formerly the water came in through one of the old drifts in great quantities, it ceased entirely there when water was cut into in one of the new drifts. About 700 gallons a day is being pumped out, so that with the exception of a few very wet spots the mine is in good condition.

Capt. Thomas Caddy now has one level at a depth of 200 feet and a sub-level worked out in several drifts at a height of forty feet above that. The sub-level is fairly dry. In many places the ore is a mixture of soft red ore with particles of very hard black ore, rich in iron which sheds the water excellently, so that the workings in those parts are very dry. The ore is generally of a bright red color, nearly all soft and running a little over 60 per cent in iron and is called Susquehanna. There are from 35 to 40 men working on each shift and ore is being mined at the rate of about 400 tons a day with a season's shipment in anticipation, of from 50,000 to 60,000 tons. The tramming is done at present in cars shoved around by men, but an electric power plant is soon to be installed, which will be of sufficient size to light the mine and furnish current for three electric motors.

The surface power plant consists of a 10-machine Rand drill air compressor with twin steam ends and compound air cylinders, a twin Webster, Camp & Lane engine of about 225 horsepower geared to 6-foot drums and hoisting a 6-ton skip. The engine cylinders are 14 x 20 inches and use steam at 125 pounds pressure. Steam is furnished by three 150-horsepower return tubular boilers built by the Milwaukee Boiler Works, though the battery includes a fourth boiler which has not yet been connected.

G. L. Woodworth is the manager of the Susquehanna mine and R. A. Angst, the superintendent and unless some untoward event occurs against which the most excellent precautions already taken will not prevail, the property should develop into a valuable proposition, as the quality of the ore is very good and there is a considerable body of it.

Manganese Ore in India.—The survey of the known manganese ore deposits in India recently carried out by the geological authorities is said to show the existence of ore in quantities sufficient to meet the large export trade in the richest varieties for many years to come, and of practically unlimited quantities of lower grade which at present prices would not pay for the high transport charges to Europe and America, but would be available for the requirements of steel manufacturers in India. In the course of the survey valuable data are said to have been obtained with regard to the geological relationships of the ore bodies, and a number of new varieties of minerals were discovered.—*Iron and Coal Trades' Review.*

Price of Carbons.—The price of carbons or black diamonds used in exploratory work in the mining region is now about $80 a carat. A dozen years ago they sold as low as $12 a carat. The supply is limited and comes principally from Brazil.

PERSONALS.

J. P. Morgan, who has been abroad for some months, returned to New York Wednesday, July 25, on the steamship Baltic.

Henry C. Frick has been added to the directorate of the Norfolk & Western railroad, in which he is a heavy stockholder.

William B. Harris has been made night foreman at the plant of the Youngstown Sheet & Tube Co. He was formerly a foreman in the Struthers mill.

W. C. Webster has been made manager of the New York sales office of the Westinghouse Electric & Mfg. Co., succeeding E. W. T. Gray, resigned.

Charles Butts, assistant geologist of the United States Geological Survey, is making an examination of the coal deposits in the Birmingham region.

J. S. Simcox has resigned as general manager of the Kentucky Chain Co., Frankfort, Ky., to engage in the manufacture of chain at another point.

Henry M. Steele, until recently chief engineer of the Central of Georgia railway, has become chief civil engineer for H. E. White & Co., of New York.

Harry Brubaker, formerly assistant superintendent of the Shelby plant of the Shelby Steel Tube Co., has been made superintendent to succeed A. C. Morse.

James Deering, vice president of the International Harvester Co., Chicago, has been decorated with the cross of the Legion of Honor by the French government.

At the annual meeting of the directors of the Youngstown Sheet & Tube Co., held last week, James A. Campbell was re-elected president and general manager.

Joseph Welsh has been made superintendent of the converting mill of the Bessemer plant of the Republic Iron & Steel Co., Youngstown, O., vice W. N. Weaver, resigned.

George E. Day, secretary and general sales manager of the Youngstown Sheet & Tube Co., Youngstown, O., has returned from a six weeks' trip to Yellowstone Park and the west.

W. P. Egan, commissioner of the National Metal Trades' Association, who has been in the southwest for several months, is paying a short visit to his home at Cincinnati. He is much improved in health, but will shortly return to the southwest for a few months, after which he expects to become active again in the affairs of the association.

J. H. Hillman, Jr., of J. H. Hillman & Son, Pittsburg, coke operators, sails for Europe on the steamer Amerika on Thursday of this week. He will stay abroad about two months.

J. W. Cregar, formerly proprietor of the J. W. Cregar Agency, Philadelphia, announces the retirement of that agency from business. Mr. Cregar has accepted a position in charge of the miscellaneous department of the Niles-Bement-Pond Co., Philadelphia.

David O. Holbrook, until recently vice president of the Pennsylvania Malleable Co. and Central Car Wheel Co., Pittsburg, has been elected vice president of the Dayton Pneumatic Tool Co., Pittsburg.

William Creahen, who built the tube mill of the Youngstown Sheet & Tube Co., has been made general superintendent of the Montreal Rolling Mill. A large tube mill is in course of construction.

The firm of Lee & Hewitt, 234 Fifth avenue, New York, has been formed by Elsworth M. Lee, of New York, and George Hewitt, of Passaic, N. J., to conduct a general consulting engineering practice.

Frank Walker, for eleven years employed at the Ohio works of the Carnegie Steel Co., Youngstown, O., has been made superintendent of the converting mill of the south works of the Illinois Steel Co. He will enter upon his new duties early in August.

J. V. Wright, formerly in charge of the labor department and factory organization of the National Cash Register Co., at Dayton, Ohio, has become connected with the acting commissioner's office of the National Metal Trades' Association as an assistant to Mr. Wuest, the secretary and acting commissioner.

A. C. Dinkey, president of the Carnegie Steel Co., was in Youngstown last week on an inspection tour. He was accompanied by I. W. Jenks, general manager of the Carnegie hoop mills. Some improvements being made at the lower works of the Union plant were inspected.

John E. Jones, who has been acting superintendent of the Tudor mill of the Republic Iron & Steel Co., East St. Louis, has been made superintendent of the Toledo mill. Thomas Cunningham has been transferred from the Toledo mill and placed in charge of the plant at East St. Louis, succeeding the late Henry Klein.

Howard A. Knauss, superintendent of the Northern Iron Co., Standish, N. Y., who recently resigned his position to take up a similar position with the Empire Steel & Iron Co., Reading, Pa., on August 1, was presented by the employes with a very fine mounted deer head, as a mark of esteem prior to his leaving.

James P. Kearns, manager of the Struthers mill of the American Sheet & Tin Plate Co., has been transferred to the auditor's office at Pittsburg. It is rumored that the Struthers mill is to resume in a few weeks.

OBITUARY.

Charles S. Fisher, assistant night manager of the Park Steel Co., Pittsburg, died July 26 in that city. He had been prominently identified with the manufacture of steel for over twenty years.

A. J. Smith, general manager and ticket agent of the Lake Shore & Michigan railroad, died July 26 in the Adirondacks. His son, Alva B. Smith, is superintendent of the blast furnace department of the Republic Iron & Steel Co., Youngstown.

Jas. R. De Remer, civil engineer and railroad builder, died July 26 at Denver, Colo., at the age of 59. He was noted for his difficult engineering feats in railroad construction, especially for the swinging bridge of the Denver & Rio Grande, through the Royal Gorge.

James Brady, for many years manager of the Brady Mfg. Co., of Brooklyn, died on July 24 at his summer home, Lake Sunapee, N. H., in his 69th year. During the civil war Mr. Brady was an inspector of ordnance. He was the inventor of a number of appliances in the field of mechanics.

Robert Aspin, superintendent of docks of the Illinois Steel Co.'s works, in South Chicago, died July 30, at the age of 70. He was the inventor of the Champion ore hoists for unloading vessels which were in wide use for many years until the system was superseded by the clamshell system.

John G. Lanning, for a number of years engaged in the manufacture of open-hearth steel, was instantly killed in Boston by an elevator accident on July 18. He was employed in connection with one of the earliest successful installations of the Siemens-Martin furnaces in the United States, manufacturing the steel for the plates for the first vessels of the new navy.

John S. Newmyer, for several years general manager of the Washington Coal & Coke Co., died recently at his home at Dawson, Pa., at the age of 59. Mr. Newmyer was first associated with his father under the firm name of Newmyer & Son, in the coal and coke business. Later he became one of the pioneer coke operators of the lower Connellsville region, and in 1892 he chartered the Washington Coal & Coke Co., and was elected manager, which position he held at the time of his death.

Plant of The Youngstown Sheet & Tube Co.

The Youngstown Sheet & Tube Co., of Youngstown, O., whose new steel plant will be completed and in operation shortly after Aug. 1, now has one of the most complete independent plants in the country, manufacturing a full line of plates, sheets, tubes and semi-finished steel in the form of billets, and sheet bars. The company has had its plant in the process of construction and in partial operation for the past five years, adding new departments from time to time until now the original plans drafted five or six years ago are near completion. The latest improvements comprise a new Bessemer steel plant together with blooming mill, continuous sheet bar mill, continuous billet mill, continuous skelp mill and universal plate mill. The plant is located on a tract of about 200 acres of land just outside the city limits of Youngstown between the Mahoning river and the Pittsburg & Lake Erie R. R. and is connected directly with the Pennsylvania, Baltimore & Ohio and Pittsburg & Lake Erie railroads and has connection through an arrangement with the latter road with the Lake Shore and Erie railroads, giving it all the trunk lines and excellent shipping facilities.

This company has a paid in capital of $4,000,000 and undivided earnings of $2,000,000 and $2,500,000 bond issue, making a total capital investment of $8,500,000.

While it has no blast furnaces on the site of the plant, adequate provisions have been made for its supply of raw material, it owning one furnace at Sharpsville, Pa., absolutely, and having contracts with five other valley furnaces for a portion of their output for the next five years, provision being made for an extension of these contracts in the event the company does not erect its own furnaces before their expiration.

The officers of the Youngstown Sheet & Tube Co. are: J. A. Campbell, president; H. G. Dalton, vice president; Richard Garlick, treasurer; Geo. E. Day, secretary and general manager of sales; W. E. Manning, assistant manager of sales; W. C. Reilly, general superintendent.

The purpose of this article is to describe the various departments of the works, including those now in course of erection and those which have been in operation for the past few years.

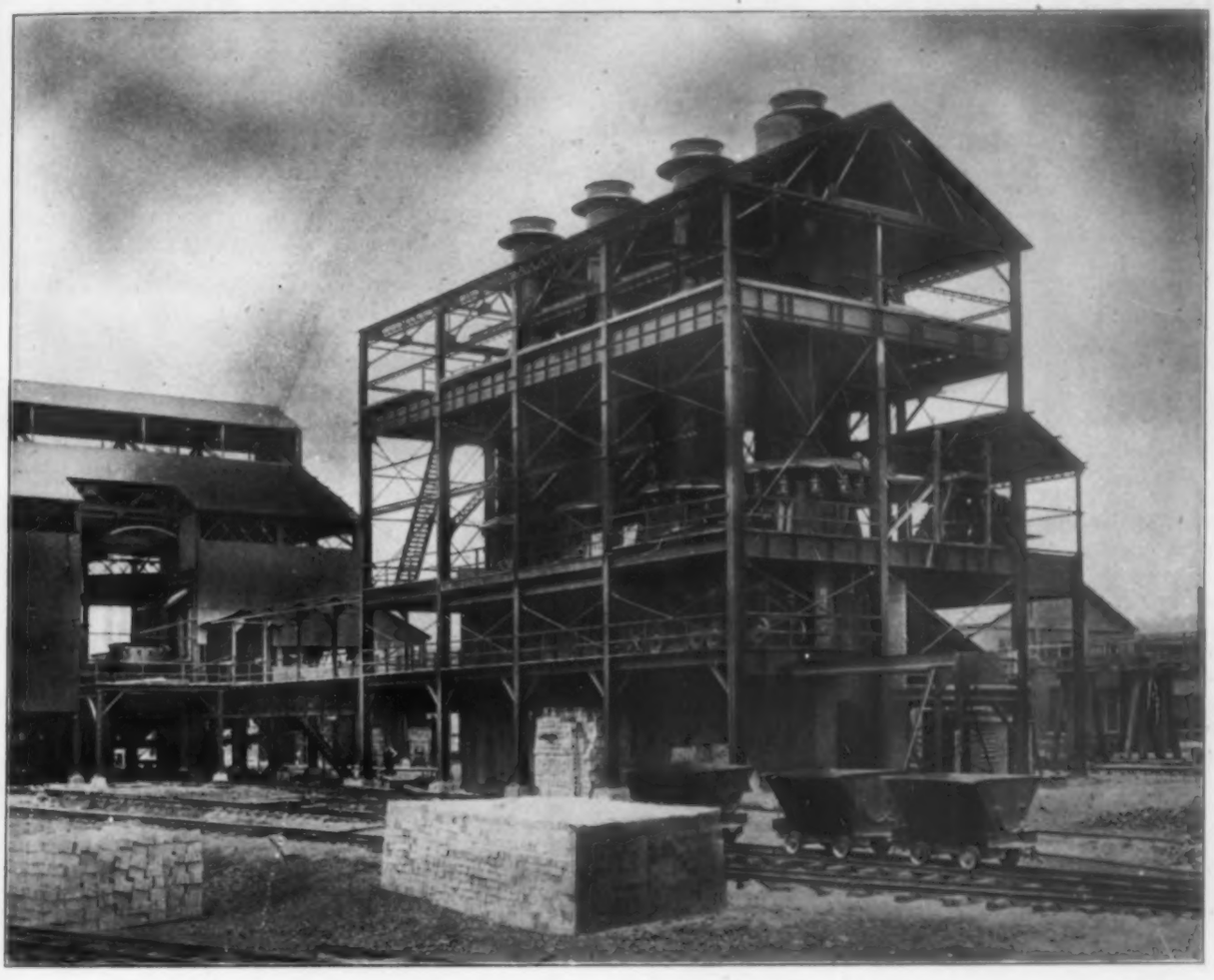


FIG. I.—CUPOLA BUILDING AND CUPOLAS. CONVERTER BUILDING AT THE LEFT.

Steel Mill.

The steel mill for the manufacture of sheet bars and billets is located on the south side of the company's property, as shown on the accompanying plan of the works. At the extreme east end of the property is located the cupola building, containing the cupolas furnishing metal for the Bessemer converters.

The cupola building, 52 by 78 feet, is a structural steel and corrugated iron structure and contains four cupo-

las, furnished by W. B. Pollock, each 10 feet six inches diameter by 22 feet in height, and of a total daily capacity of 1,600 tons. The cupola building is arranged with a number of floors at different levels, the base of the cupolas being about 14 feet above the ground. Instead of a charging door at the top, the cupolas end at the charging floor level, and hoods and stacks are placed about four feet above them to remove the waste gases. The cupolas are thus accessible from all points for charging. Pig iron and coke are brought to the charging floor by means of an Otis elevator extending from the ground level to the top of the building. This is driven by an Otis duplex engine.

Blast is furnished to the cupolas by means of four No. 10 Sturtevant blowers, each direct-connected to a 100-horsepower Westinghouse motor. The blowers are so interconnected that any blower can furnish blast for any cupola. Each cupola is located over a chute leading to the ground, so that when the bottom is dropped the material will be discharged into a car on a track below in such a manner as to not interfere with the working of the other cupolas.

The building containing the Bessemer converters is located about 60 feet west of the cupola house, with which it is connected by means of a covered bridge, across which the hot metal is brought from the cupolas to the converters. A 15-ton hot metal car is used for this purpose, being operated by an electric car haul. The converter building is 70 by 120 feet, in addition to a lean-to to be used for ladle drying. The building is of structural steel and corrugated iron construction. Two 10-ton converters are installed in it, which are operated by means of two vertical racks and a pinion. They are served by a 20-ton hydraulic ladle crane, built by the Morgan Engineering Co., Alliance, O.

The operator's pulpit is elevated and located at the south side of the building about 90 feet distant from the converters and removed from the intense heat. The pouring tracks run through the center of the building, the stand for the workmen engaged in teeming the steel and in covering the ingot molds extending the full width of it. The ingot cars are moved by a car pusher located about 20 feet east of the building.

This building contains some additional equipment distributed on the various floors. Among the more important may be mentioned a set of hot metal scales, which are located on the vessel floor of the building for weighing the metal as it comes from the cupolas and before being charged to the converters. An electric car tilting apparatus is also located on this same floor, as is a coke-fired manganese furnace, 12 x 5 feet.

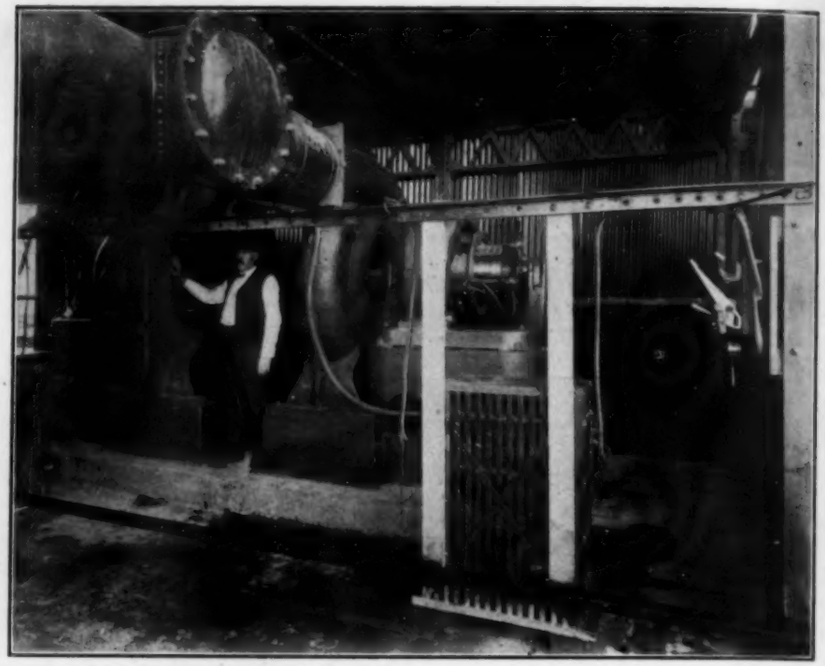


FIG. 2.—GROUP OF MOTOR-DRIVEN BLOWERS IN CUPOLA HOUSE.

The third floor of the converter building is known as the scrapping floor. An Otis hoist extends from the ground for elevating scrap to this floor. Two chutes lead from the third floor, one for conveying scrap and the other for conveying roll scale into the nose of the converters. A 25-ton electric crane spans the converter building for use in changing ladles and for handling stoppers in and out of the ladles. The only other equipment in the converter building is an oven installed near the operating stand for the drying of stoppers.

The converter engine house is located north of the converter building. The building is 120 by 51 feet and is an iron skeleton filled with brick, with a tiled roof. It contains a Tod cross-compound blowing engine with cylinders 44 and 84 x 72 inches and two blowing tubs 76 x 72 inches.

The very important feature of accessibility has been carefully considered

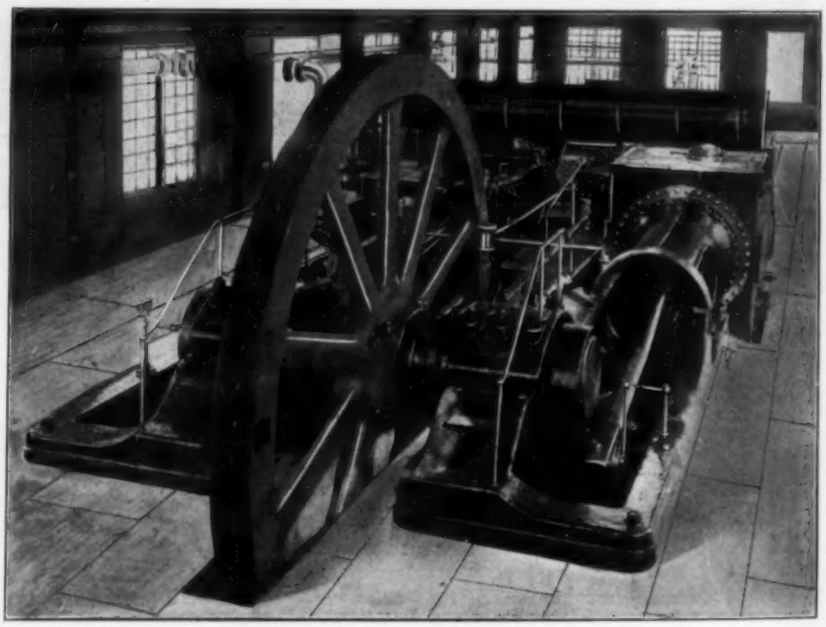


FIG. 3.—BLOWING ENGINE FOR CONVERTERS.

in every detail of this engine. It is designed to run at 40 revolutions per minute against 25 pounds normal blast pressure, and a maximum blast pressure of 30 pounds. The maximum speed of the engine is 50 revolutions per minute at which speed it has a piston displacement of 37,500 cubic feet of free air per minute.

The general design of the engine is very well shown in Fig. 3. The frames are of the usual side-crank bored-guide type, with babbitted quarter boxes and removable shells in the main bearings. The diameter of the shaft in the bearing is 24 inches with a diameter of 28 inches in the fly wheel, which is 24 feet in diameter.

The steel crosshead has a 11½-inch x 13-inch pin, babbitted shoes with wedge adjustment, and the piston rod is secured by a taper key. Fastened to the bed plate on each side and running back the entire length of the engine, including the tail rod support back of the air cylinder, is a deep and heavy sole plate, which is firmly held to the foundation by numerous foundation bolts.

The cylinders are equipped with single wrist-plate Corliss gears. The steam and exhaust valves are all double ported. The two cylinders are connected together by an overhead receiver of proper proportions. The pistons are steel castings of conical type, fitted with steel follower rings and segmented cast iron packing rings. They are carried free from the cylinders by cambered rods.

The air cylinders are connected to the steam cylinders by heavy cast iron tie pieces, and are supported on two vertical steel plates placed transversely to the center line of the engine and bolted to the air heads and sole plate. This construction holds the cylinders in perfect alignment vertically and laterally but has great longitudinal flexibility to allow for expansion. The cylinders are equipped with Tod patented, double port piston inlet valves, and automatic outlet valves, all driven from a wrist plate for each cylinder, which in turn is driven by a separate eccentric on the main shaft.

The additional equipment contained in this building consists of two hydraulic pumps furnishing pressure for the steel departments of the works. These are Epping-Carpenter pumps 18 and 23 x 9 x 36 inches and of the compound-duplex type. There is also an 18-inch accumulator installed. The return tank for the pumps and accumulator, 15 feet diameter by 25 feet high, is located outside of the building. A Weiss condenser in the building takes care of the exhaust from the blowing engine and pumps. A filtering plant is being erected immediately to the north of the engine house. It will have a capacity of 60,000 gallons per hour, and will purify the water for the boiler plant.

Another building, which is practically an auxiliary of the converter plant, is the bottom house. This is a structural steel and corrugated iron building, 46 by 184 feet and located southwest of the engine house. It has, at each end, a lean-to in each of which are two bottom ovens. Each oven has a capacity of two bottoms, so that eight converter bottoms can be dried and baked at one time. In the main portion of the bottom house are three

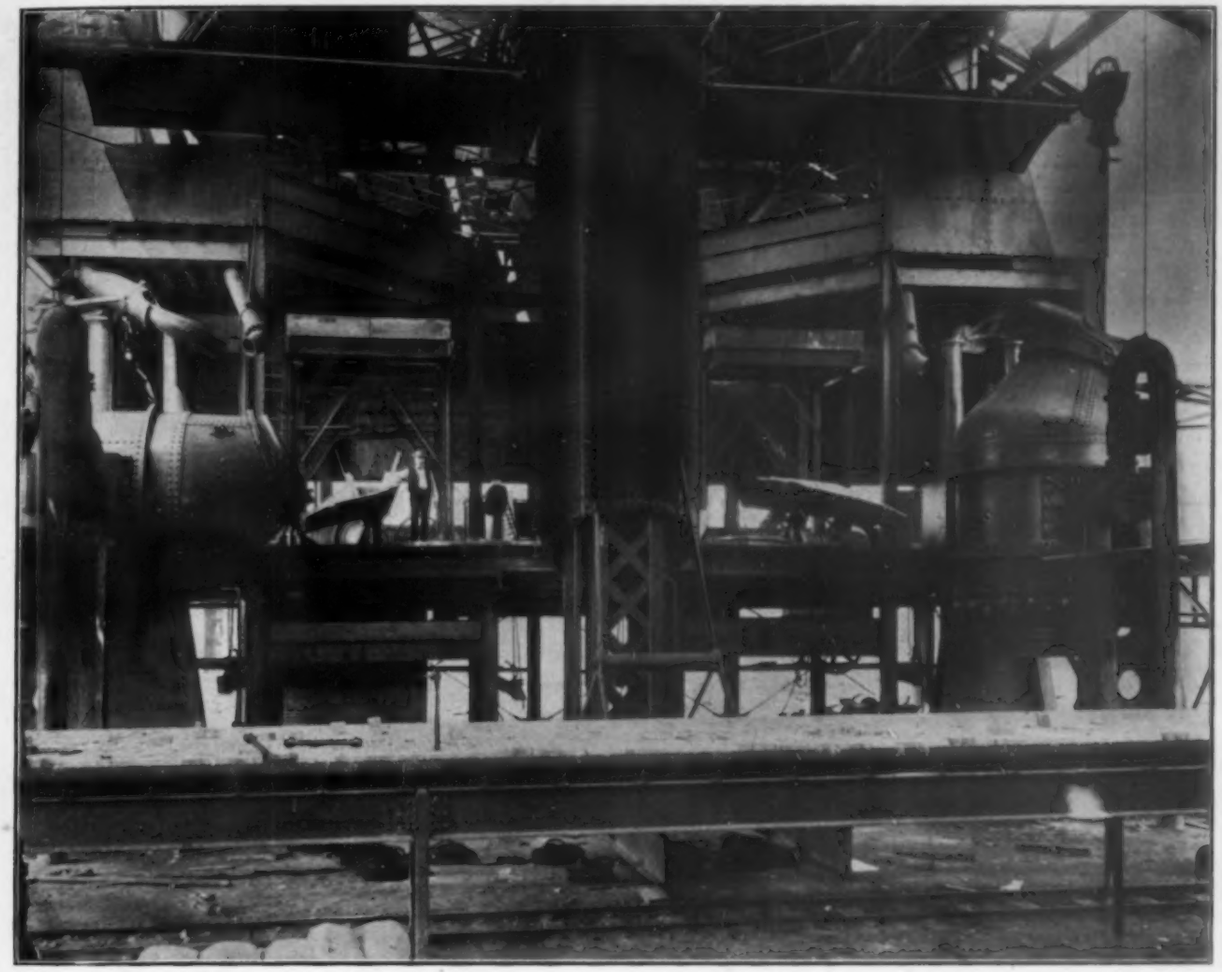


FIG. 4.—BESSEMER CONVERTERS IN CONVERTER HOUSE.

grinding machines, one of which is an eight-foot dry grinder, the other two being seven-foot wet grinders. In addition to the grinders there is a Blake 12-inch by 20-inch crusher. The crusher and pans were furnished by Thomas Carlin & Sons, of Pittsburg, and are each separately driven by Westinghouse 35-horsepower motors. A 10-ton Morgan crane spans the building for convenience in handling machinery and repair work. A trestle, which is continued from the one serving the steel plant runs alongside the building and allows ganister, etc., to be discharged directly into it.

Passing now to the steel mill proper, all the buildings of which are of structural steel and corrugated iron construction, the first building at the east is that containing the soaking pits. This is 286 by 84 feet, with a lean-to on the north 23 by 250 feet. The main building contains four four-hole soaking pits, each hole having a capacity of four ingots, making a total capacity for the furnaces of 64 ingots. Two Morgan charging cranes of 75 feet span and 10 tons capacity serve this building for charging and drawing the ingots. On the same runway with the charging cranes is a 10-ton Morgan ingot stripper. The charging cranes are each fitted with an auxiliary five-ton hoist for repair work.

The gas valves and the operator's valves are located in the lean-to, the operating platform being elevated about four feet above the floor level of the soaking pit building, while the valves themselves are immediately underneath the platform about four feet below the main floor level. The valves are of the Kennedy mushroom type, and are all water-cooled. The air valves are 36 inches, the main gas valves 28 inches and the regulating gas valves 18 inches diameter.

The gas producers furnishing the fuel for the soaking pits are located in a producer house, immediately to the north of the soaking pit building, and which is 170 feet by 28 feet 6 inches in dimensions and contains eight 12-foot double-hopper Duff producers, there being two producers for each furnace. Coal is delivered for the producers from the steel plant trestle to the floor of the building whence it is shoveled into the producers.

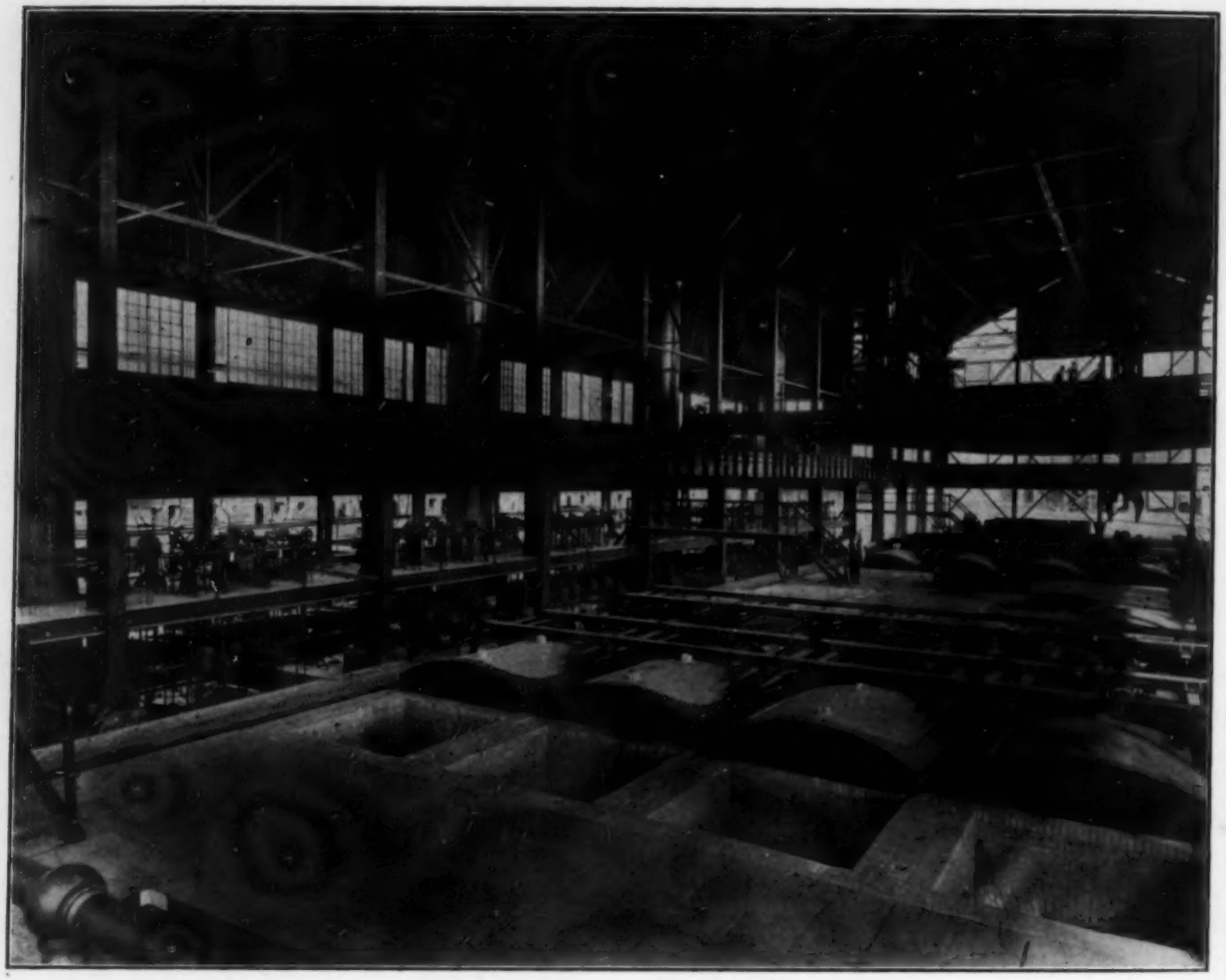


FIG. 5.—SOAKING PITS AND OPERATING VALVES.

Blooming Mill.

The blooming mill building adjoins the soaking pit building on the west. In dimensions, it is 340 by 64 feet 6 inches with one lean-to 45 by 80 feet. The ingots, as they are lifted from the soaking pits are placed on a cable-driven tilting car and conveyed to a 40-inch blooming mill, which is worthy of more than passing notice, as it is one of the first of its type in the country. It was designed by Julian Kennedy and built by the Lloyd Booth department of the United Engineering & Foundry Co. at Youngstown. The housings of the mill are built up of steel forgings. The screw-down is electrically operated, the screws being motor driven through a worm and wheel.

The driving pinions of the mill are cut steel gears with herring-bone teeth, and the spindles between the pinions are steel forgings made by the Bethlehem Steel Co. The couplings between the mill and engine are of the Kennedy patent toggle joint type. The mill is

driven by a Tod, 54 x 66-inch reversing twin engine, which is installed in the lean-to.

The bed plates of this engine are of the Tod usual flat guide, side crank style of extra heavy construction. The main bearings are 26 x 50-inch with babbitted quarter boxes and loose bottom shell. The caps are also made extra heavy to withstand the enormous shocks usual with a reversing engine. The mill side of the engine has a Kennedy return crank for direct coupling to the roll train. The fan-tail cranks are steel castings pressed on and keyed to the shaft. The crank pin on the mill side is 25 inches x 13 inches with a marine end connecting rod. The opposite side has a crank pin 15 inches x 13 inches and solid end connecting rod.

The crossheads are steel castings with 14 x 14-inch pins.

A heavy sole plate between the engines supports the steam reversing gear and oil cylinders. The reversing gear is of the Stephenson type with a special parallel motion for supporting the link block. The links and all of the rocker arms are steel castings. The floating gear enables the links to be graded to any cut-off desired and makes possible a complete reversal of the engine, in the shortest possible time.

The cylinders are fitted with twin tubular piston valves. The pistons are conical steel castings with cast steel follower rings and segmental cast iron packing rings. They are carried on 14-inch hollow forged steel piston rods. The throttle valve is of the double-port piston valve type, operated by steam and oil cataract cylinders.

An idea of the size of the engine may be obtained from the fact that it is capable of developing 25,000 horsepower when running at 150 revolutions per minute.

The mill tables are built of steel castings, each casting having an oil pocket which extends the length of the castings and communicates with the pocket in the adjoining one, thus making a continuous oil channel extending the full length of the table. These pockets contain the oil supply for self-lubricating bearings of the table rollers, the oil being supplied to the bearings by means of a ring in a similar manner to that used in electrical machinery. All the gears on the tables are cut from steel castings and the tables are driven by two 100-horsepower motors.

All the motors are the new form W Crocker-Wheeler type, especially designed for this plant, and constructed to meet the very heavy demands of rolling mill service, which requires a completely enclosed motor for intermittent but excessively heavy and jerky work. The chief characteristics comprise great mechanical strength, absolutely closed bearings that exclude all dirt, ideal commutation obtained by single-turn armature coils and asbestos insulation. The field frame is of steel, octagonal shaped, with four poles and is divided horizontally, the halves being held by four heavy bolts on the outside, enabling the upper half to be removed easily. Each foot is drilled for two heavy holding-down bolts which will retain the motor securely on its foundation. The foot is designed for great strength in order to withstand the heavy torque peculiar to this class of motors. The clamping bolts of the commutator are accessible from the front of the commutator, which facilitates its removal. The shafts are of forged steel turned and ground to exact dimensions and

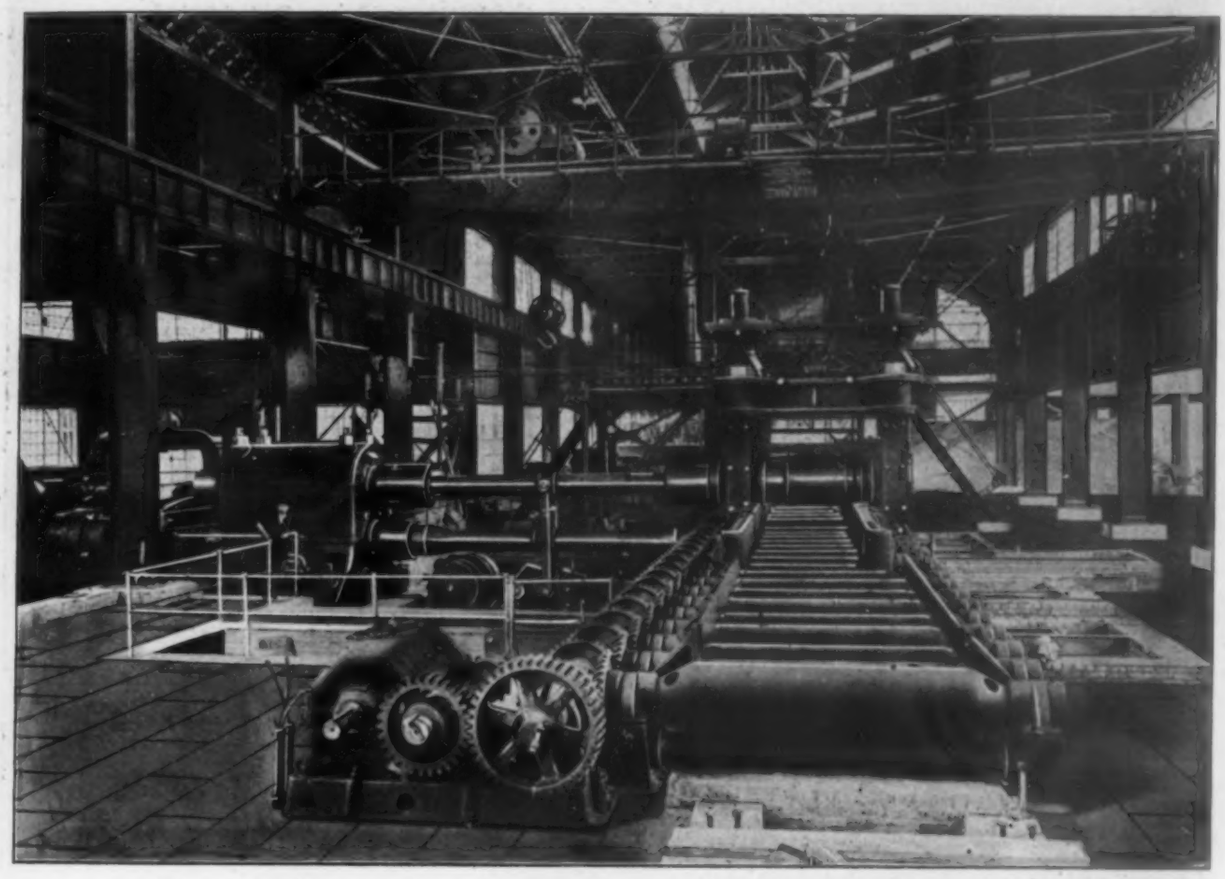


FIG. 6.—ELOOMING MILL, TABLE TO SHEET BAR MILL NOT INSTALLED. SPECIAL ELECTRIC MOTOR IN FOREGROUND.

are much larger than for other types of motors of the same output. Each coil of the armature windings consists of a single turn of flat strip copper, separated by asbestos, without joint except where soldered to the commutator bar. The commutation conditions are as favorable as can be produced. No band wires are used on the armature core except one at each end outside of the core, to hold down the coil ends below the surface of the core. The air gap is made large enough to minimize the trouble due to wear of bearings and displacement of armature from its central position. The brushes are carried in cast bronze boxes which are clamped to large square steel studs securely screwed into the ends of the motor frame and insulated by a fibre tube. The brushes fit accurately in the boxes, sliding in machined ways and are held against the commutator by curved fingers actuated by coiled springs.

West of the blooming mill runout tables are two tables connected by means of a transfer. These are so arranged as to run the bloom either to a hydraulic cropping shear and thence direct to the continuous sheet-bar mill, or to an electrically-driven shear which will shear sections 6 x 30 inches to lengths suitable for shipping purposes. The electric shear is driven by a 100-horsepower motor and was described in THE IRON TRADE REVIEW of May 10, 1906. A scrap conveyor underneath both the hydraulic and electric shears removes the crop ends to one side, while another conveyor conveys the sheared billets from the electric shear to a railroad track alongside the building for shipping. The cropping shear was designed by Henry Aiken and built by the Hydraulic Machine Co.

FIG. 7.—GENERAL VIEW OF INTERIOR OF BLOOMING MILL BUILDING.

Sheet Bar Mill and Billet Mill.

From the cropping shear, a table extends directly to an 18-inch continuous sheet-bar mill. An 18-inch continuous billet mill is located alongside of the sheet bar mill, the piece being conveyed to its table by means of a transfer from the table extending from the shear; an auxiliary flying shear is placed in front of each mill for emergency use and for cropping split ends. These mills are located in a building 220 by 107 feet six inches with two lean-tos 80 by 35 and 60 by 35 feet, respectively, at the northwest and southwest corners of the building. Alongside of the table leading from the cropping shear, space has been left for the installation of reheating furnaces, if such furnaces should be found necessary after the piece has passed through the blooming mill. The sheet-bar and billet mills were designed by the Morgan Construction Co., of Worcester, Mass., and built by the Lloyd-Booth department, United Engineering & Foundry Co., and consists of eight stands driven by a Filer-Stowell cross-compound, condensing engine with cylinders 48 and 84 x 60 inches. This is located in the lean-to at the northwest corner of the building and drives the mill through a series of miter gears, of such dimensions as to give the various stands progressively increasing rates of speed, the first stand running at about 16 and the last about 90 revolutions per minute.

The billet mill located alongside the sheet-bar mill consists of 10 stands and is driven by a Filer-Stowell engine exactly similar to the one driving the

sheet-bar mill, and located in the lean-to on the southwest corner.

The material leaving the bar mill goes to a hot bed and that from the billet mill to a cooling bed, these being located outside the building, first passing through a pair of flying shears for cutting the material to length. The beds are located as shown in the plan of the plant, underneath a crane runway, 90 feet center to center, which is spanned by two 15-ton cranes with double hoists for handling the material from the cooling beds. The runway is 480 feet long and extends to the skelp mills on one side and to a shipping track on the other side of the cooling beds. On the opposite side of the runway from the sheet bar and billet mill is another electric shear exactly similar to the one in the blooming mill for shearing 4 x 4-inch billets to short lengths.

A bar piler under the crane runway and alongside one end of the cooling bed piles the sheet-bars for shipment purposes.

Muck-Bar Mill.

The raw material for the various other mills of the plant enters in the shape of pig iron on a trestle at the east end of the works. From the trestle the pig iron is charged into double puddling furnaces, where it is worked up into muck bar. The puddling furnaces are of the double type, 16 in number, and are located in a structure 225 by 106 feet in dimensions. The furnaces are located in two rows, one along each wall of the building, and each is surmounted by a 150-horsepower Cahall vertical waste-heat boiler, with the exception of one which is surmounted by a 250-horsepower waste-heat boiler.

The muck-bar mill, located in a building directly west of and adjoining the puddling building, is 60 by 154 feet 9 inches in dimensions and extends at right angles to the building containing the puddling furnaces and is equipped with a 10-ton electric traveling crane.

This mill consists of two trains of rolls, one train equipped with a No. 0, and the other with a No. 1 Lloyd-Booth rotary squeezer, the former train for rolling six-inch to eight-inch and the latter three-inch to five-inch muck bar. The mills and squeezers are driven by a cross-compound condensing engine with cylinders 24 and 42 x 42 inches.

The muck bar is delivered on runout tables, on which it is weighed. The scales are of the disappearing type, the platform projecting up between the rollers and lifting the bars therefrom, as desired. The bars are then transferred to a cooling bed, along which they are moved and finally piled at one side. The cooling beds and the piler are located underneath the runway of a five-ton crane, which is 242 feet long and which extends beyond the building and over both a standard and a narrow gauge railroad track. The piled bars are handled by this crane to cars which transfer them to the sheet or skelp mills as desired. The five-ton crane over the cooling bed may also deposit the bars upon a table which feeds them to a Lloyd-Booth electric shear located in a small building west of the crane runway where they are sheared to proper length for use in the finishing mill.

FIG. 8.—GENERAL VIEW OF BLOOMING MILL, SHOWING RELATION OF SHEARS AND TABLES.

Sheet Mill.

The sheet mill is located about 150 feet due west of the puddling mill in a building 362 feet 2 inches by 76 feet, with a lean-to on the north side 362 feet by 36 feet wide. In the lean-to are located the heating and annealing furnaces. The former consist of six Swindell sheet and pair furnaces, the latter of four Swindell double annealing furnaces. The fuel used in these furnaces is producer gas, which is furnished for the sheet and pair furnaces by three Swindell producers located in two buildings directly north of the lean-to. The gas for the annealing furnaces is furnished by two Swindell producers located in a third building north of the lean-to. The relation of these various buildings to each other is clearly shown by the accompanying plan of the works.

The equipment of the sheet mill consists of three stands of roughing and six stands of finishing rolls 26 inches in diameter. These mills are located on the east side and on the west side of a 24 and 48 x 48 cross-compound condensing Tod engine. These mills range from 34 inches to 50 inches in length. The building also contains three steam driven doubling hammers.

The mills are parallel with the long dimensions of the building and are situated approximately on its center line. The cold rolling is done in three stands of 24-inch cold rolls, situated about 110 feet from the west end of the building and extending across it.

These are driven by a Buckeye tandem-compound engine with cylinders 13 and 26 x 36 inches. The annealing furnaces are situated at the extreme west end of the mill. This building is spanned by a 25-ton crane with a 5-ton auxiliary hoist.

Adjoining the southwest corner of the sheet mill and forming an L with it is the sheet warehouse, an all steel building 66 by 200 feet. A standard gauge railroad track runs across the end of the warehouse and the sheets are shipped from a platform adjoining it.

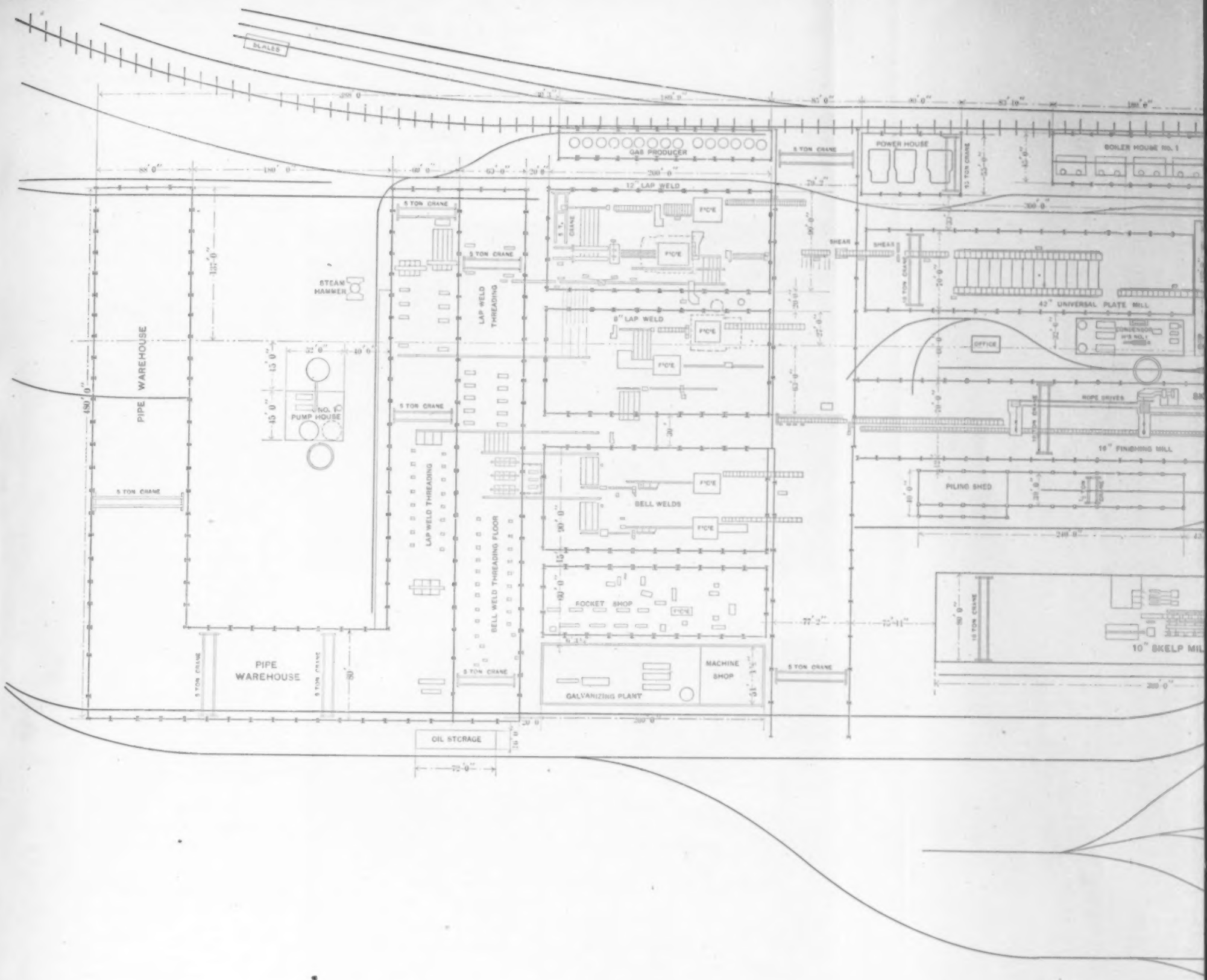
Directly west of the sheet warehouse is located the roofing works. This shop is completely equipped with machinery for producing all varieties of roofing, siding, etc.

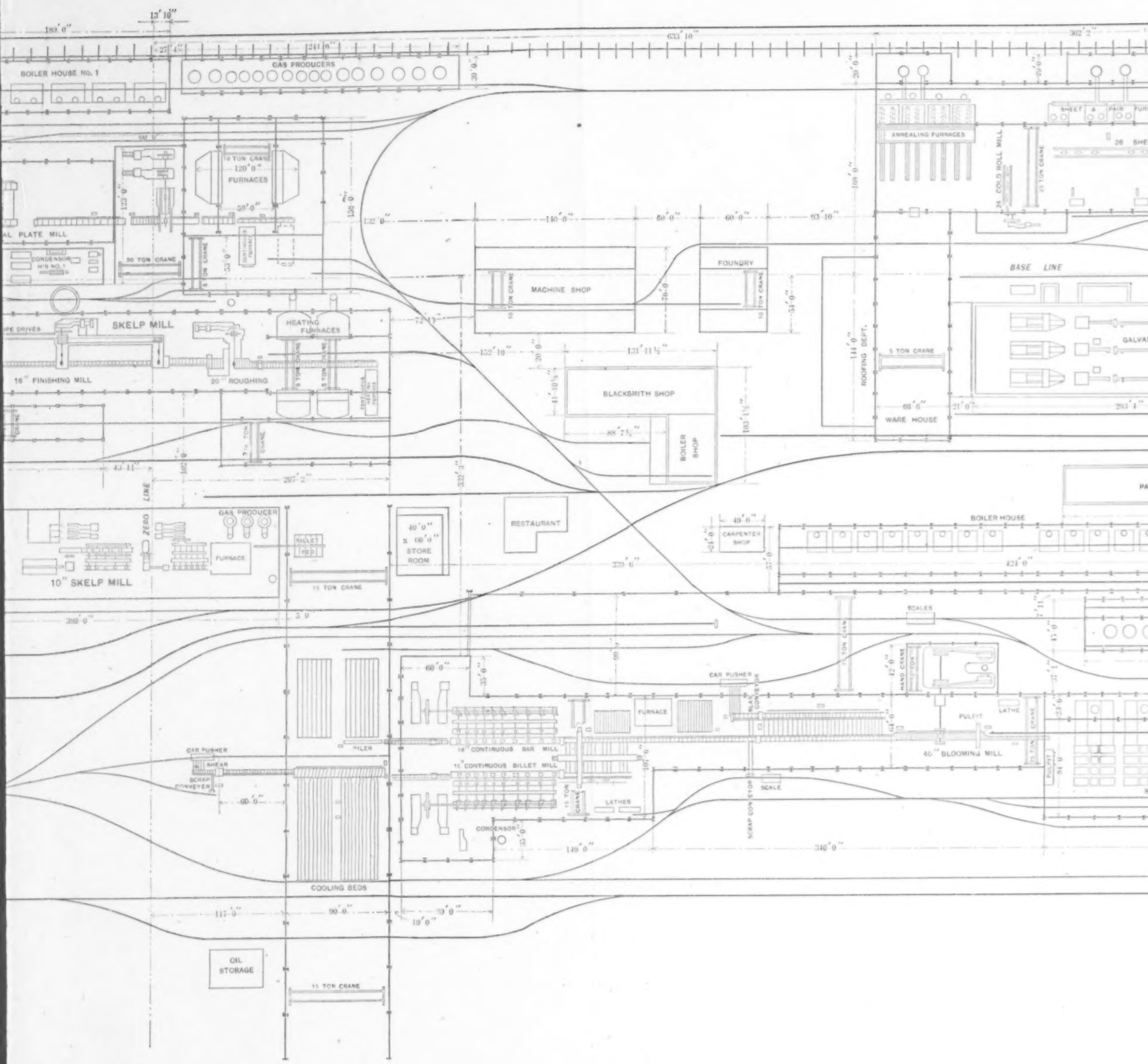
In the angle of the L is situated the sheet galvanizing plant, which is housed in a building 293 feet 4 inches by 81 feet. The sheets are galvanized by a new process which has been patented and is controlled by the Youngstown Sheet & Tube Co. After galvanizing the sheets are shipped from a platform adjoining and extending the entire length of the building. This shop is equipped with three galvanizing kettles.

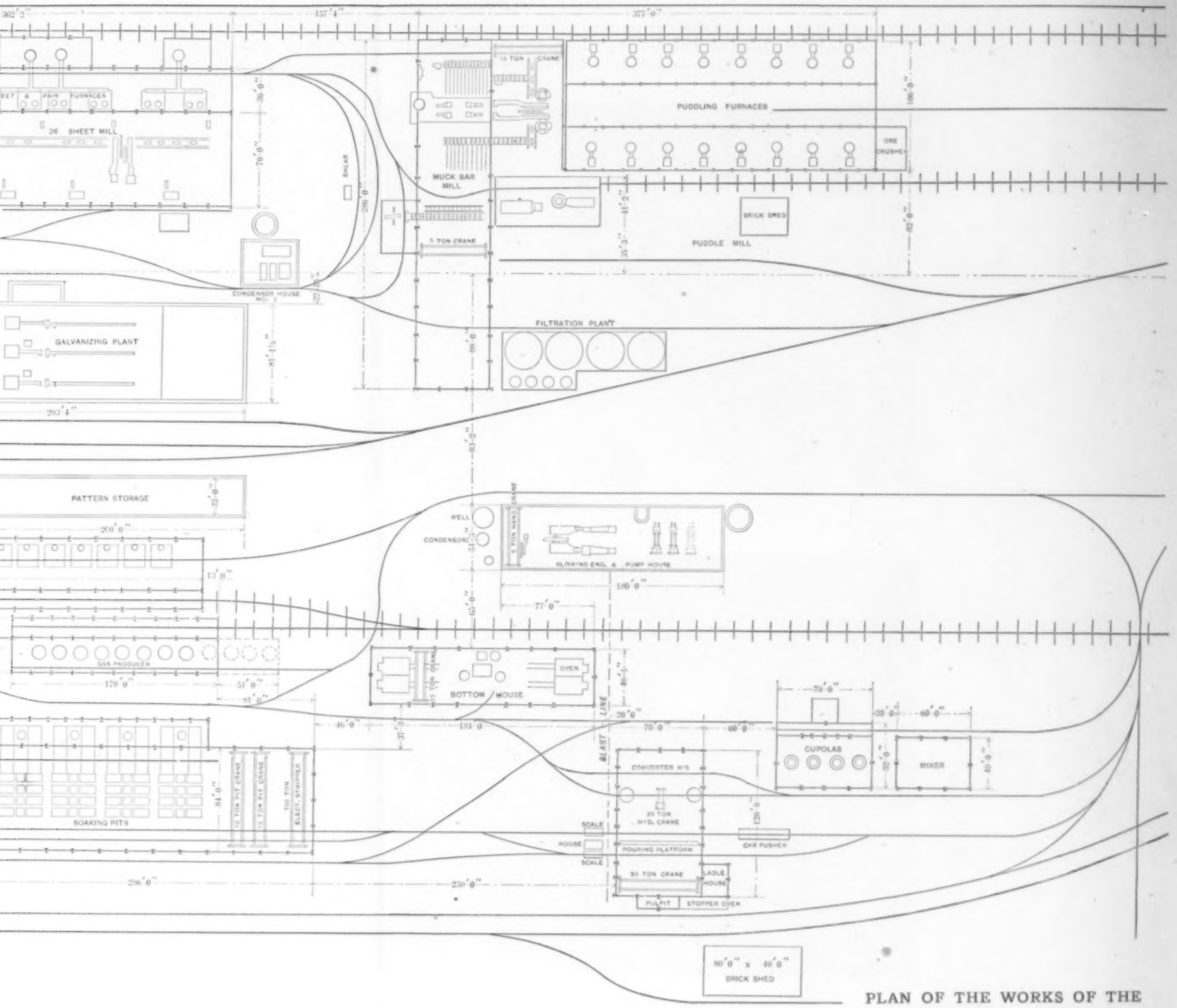
FIG. 9.—CONTINUOUS SHEET BAR AND BILLET MILL.

Skelp Mills.

The company has three skelp mills, one in operation and two in course of erection. These are located directly west of the sheet mill and about 450 feet distant. The skelp mill which is in operation is housed in a building 548 by 70 feet, with a lean-to 148 by 66 feet. At the east end of the mill building and also in the lean-to are located five furnaces, four of them being iron furnaces, with an 18-foot


SLAGS
GAS PRODUCER
POWER HOUSE
BOILER HOUSE No. 1
5 TON CRANE
12" LAP WELD
8" LAP WELD
F'C'E
SHEAR
42" UNIVERSAL PLATE MILL
OFFICE
ROPE DRIVEN
10" FINISHING MILL
PILING SHED
10" SKELP MIL
STEAM HAMMER
LAP WELD THREADING
BELL WELD THREADING FLOOR
BELL WELDS
POCKET SHOP
MACHINE SHOP
GALVANIZING PLANT
PIPE WAREHOUSE
NO. 1 PUMP HOUSE
OIL STORAGE


BOILER HOUSE No. 1
GAS PRODUCERS
ANNEALING FURNACES
24" COLD ROLL MILL
10 TON CRANE
120'0" FURNACES
30 TON CRANE
SKELP MILL
HEATING FURNACES
16" FINISHING MILL
20" ROUGHING
MACHINE SHOP
FOUNDRY
BLACKSMITH SHOP
BOILER SHOP
ROOFING DEPT.
5 TON CRANE
WARE HOUSE
BASE LINE
GALVA
ZERO LINE
GAS PRODUCER
FURNACE
10" SKELP MILL
15 TON CRANE
40'0" x 60'0" STORE ROOM
RESTAURANT
CARPENTER SHOP
BOILER HOUSE
SCALES
CAR PUSHER
SHEAR
SCRAP CONVEYER
PILER
18" CONTINUOUS BAR MILL
15" CONTINUOUS BILLET MILL
FURNACE
SLAB CONVEYOR
HAND CRANE
PULPIT
LATHE
40" BLOOMING MILL
SCRAP CONVEYOR
SCALE
CONDENSOR
COOLING BEDS
OIL STORAGE
15 TON CRANE



PLAN OF THE WORKS OF THE YOUNGSTOWN SHEET & TUBE CO., YOUNGSTOWN, OHIO.

hearth and one a continuous steel furnace with a 34-foot hearth. The producer gas for these furnaces is furnished by two Laughlin and six Duff double hopper producers located in a building directly north of the plate mill. Between the furnaces is installed a table for conveying the metal to a 20-inch roughing mill, located just west of the heating furnaces.

After the metal passes through the roughing rolls it is delivered to two stands of 16-inch strand rolls and one stand of 16-inch bullheads; these three stands are located in tandem with a conveying table between. After passing through the bullheads it is conveyed by a runout table to a transfer which delivers it to a shear table located just north of the runout table. A Lloyd-Booth electric shear at the end of the shear table cuts the skelp into 20-foot lengths, after which it is piled in the skelp yard which extends across the west end of the skelp mills and is served by two 5-ton cranes.

The roughing mill is driven direct by a Tod tandem-compound condensing engine with cylinders 22 and 40 x 48 inches. The 16-inch stands are driven by a tandem-compound, condensing engine with cylinders 22 and 40 x 33 inches, and running at 150 revolutions per minute. The second stand of 16-inch rolls is driven direct. Rope drives connect this engine to the first of the 16-inch stands and to the bullheads, the rope drive to the bullheads being the longest one of its type. These drives are of the American type and comprise 16 strands of 2-inch rope. This building is equipped with a 10-ton crane, which operates over all the mills and tables.

The skelp mills under construction consist of a universal plate mill and a 10-inch Morgan continuous mill.

The furnace equipment in the plate mill will consist of two Smith gas furnaces used for heating iron or steel and one Laughlin continuous steel furnace. The gas for these furnaces will be furnished by 6 Laughlin and 2 Duff double-hopper producers located in a building directly north of this mill. The Smith furnaces are to be served by a Wellman-Seaver-Morgan overhead type charging and drawing crane. The continuous steel furnace is served by a 5-ton overhead Shaw electric traveling crane. The billets will be conveyed from the furnaces to the mill on motor-driven tables as shown in the plan.

The plate mill was designed and built by Mackintosh-Hemphill & Co., and was described in THE IRON TRADE REVIEW of July 5, 1906; the rolls are 27 inches in diameter by 72 inches long. It will roll plates from 11-inch to 42-inch universal, and by removing the vertical rolls can roll up to 63 inches in sheared plates. The mill will be driven by a twin reversing Mesta engine 44 x 60 inches.

After rolling, the plates will be delivered on tables which will convey them to a cooling bed 135 feet long by 32 feet wide. From this table the sheared plates are to be carried on tables to a pair of Newbold rotary shears; they will then pass through an R. D. Wood gate shear where the ends will be cropped, and the plates cut to length. The plates will then be delivered by tables to the skelp yard.

The furnaces are to be covered by a steel building 120 by 158 feet, and the mill and engine building will be 100 by 60 feet, also of steel construction. The tables and shears are housed in a building 300 by 70 feet. The crane service will comprise a 25-ton, 54-foot crane in the mill building and a 67-foot, 10-ton crane in the building containing the tables. The runway of the crane in the mill building extends north and south while that in the table building extends east and west.

The arrangement of this mill was devised by S. V. Huber & Co., Pittsburg.

The 10-inch continuous mill under

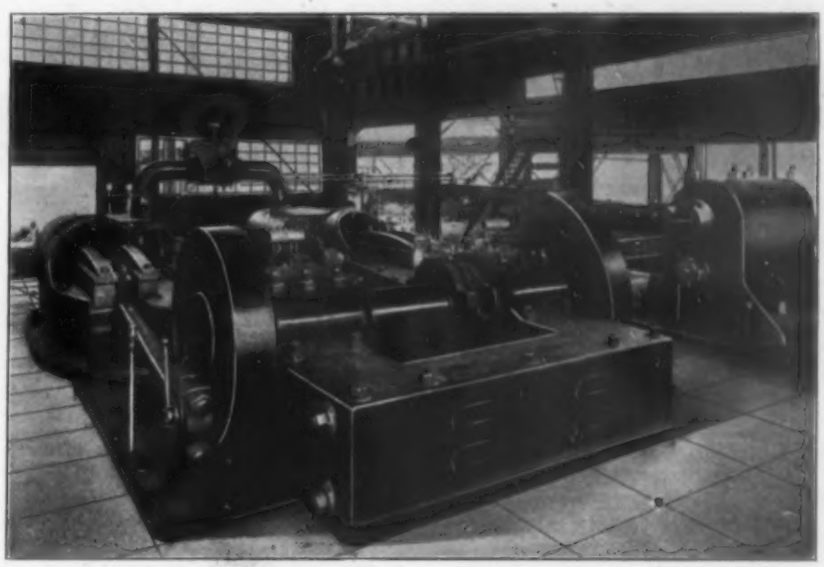


FIG. 10.—REVERSING ENGINE DRIVING BLOOMING MILL.

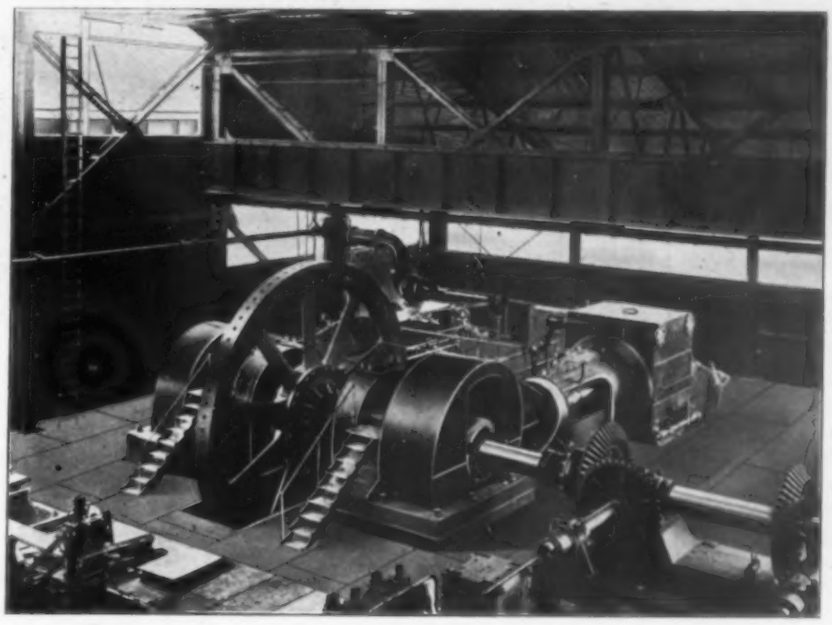


FIG. 11.—ENGINE DRIVING THE SHEET BAR MILL.

construction is located south of the present 16 and 20-inch skelp mill and immediately west of, and adjoining the billet and sheet-bar yard. This mill is to consist of ten stands of rolls in tandem, and the additional equipment will comprise one Morgan continuous heating furnace with a hearth 32 by 20 feet. The gas for this furnace will be furnished by three Morgan continuous producers immediately north of the furnace. The roll train will consist of one Morgan continuous roughing mill, comprising two stands of 12-inch diameter and four stands of 10-inch diameter rolls, one stand of special edging rolls, 10 inches diameter and three stands of 10-inch finishing rolls, all in tandem. This mill will be of Morgan Co.'s standard type with independent self contained pinion housings, open-hearth steel pinions, etc.

The roughing mill will be driven by a cross-compound Corliss condensing engine with cylinders 26 and 48 x 48 inches, built by the C. & G. Cooper Co., Mt. Vernon, Ohio. An engine of the same type will drive the three stands of the 10-inch mill. The edging rolls are to be driven by a 12 x 26-inch Cooper engine.

Between the continuous furnace and the first stand of roughing rolls there will be installed a double toggle emergency shear. Between the last stand of roughing rolls and edging rolls there will be an Edwards flying shear for emergency use and for cropping split ends.

The mill is designed to roll billets 1¾ by 1¾ inches and wider in 30-foot lengths. It will roll skelp 4¼ by ⅛ inches and lighter sections.

The billets will be delivered from the billet yard to a billet bed located under the crane in this yard and immediately east of the reheating furnace in the 10-inch mill. From this bed they will be charged into the continuous heating furnace.

After leaving the finishing mill the skelp will be cut to length in an Edwards rotary shear and will be piled ready for transfer to the skelp yard in a special design of piler.

This mill is to be in a steel building whose dimensions are 380 by 80 feet with a crane service furnished by a 10-ton electric crane spanning the entire building.

Tube Mills.

The tube mills comprise two bell-weld and two lap-weld mills. They are located west of the skelp mills, and on the opposite side of the skelp yard, which extends along one end of the skelp mills. The floor level of these mills is seven feet above that of the skelp yard, and material is elevated from the skelp yard by the two five-ton cranes before mentioned and placed on tables which convey it to the furnaces in the tube mills.

The lap-weld departments are situated north of the bell-weld departments, and are housed in two buildings, each 200 by 90 feet. The tables from the skelp yard place the skelp in front of the bending furnaces, from which tables it is charged into the furnaces. The draw-benches are located on the opposite side of the bending furnace from the table, and the heated skelp after passing through scarfing rolls and the bending box, is moved transversely across the mill on a table, consisting of inclined tracks, and in the No. 2 lap-weld mill is placed on a car, which can be run to the back of the welding furnace. This car with a piece of pipe placed thereon can be seen in front of the second furnace in the illustration, Fig. 13. In the No. 1 lap-weld mill the skelp from the draw-bench is moved to the back of the welding furnace and is deposited in a trough. An electric pusher shoves the pipe from the car, or trough, into the furnace, and after it has been brought to the proper temperature, it is run through the lap-welding rolls. A transfer then moves it to one side to the sizing and straightening rolls located alongside of the furnace. The straightening rolls deliver it to a transfer table leading to a conveyor which moves it to the threading department. The transfer table is located immediately opposite the first position of the charging car, and any defective pipe instead of being placed on the transfer, are loaded on the car and sent through the furnace a second time.

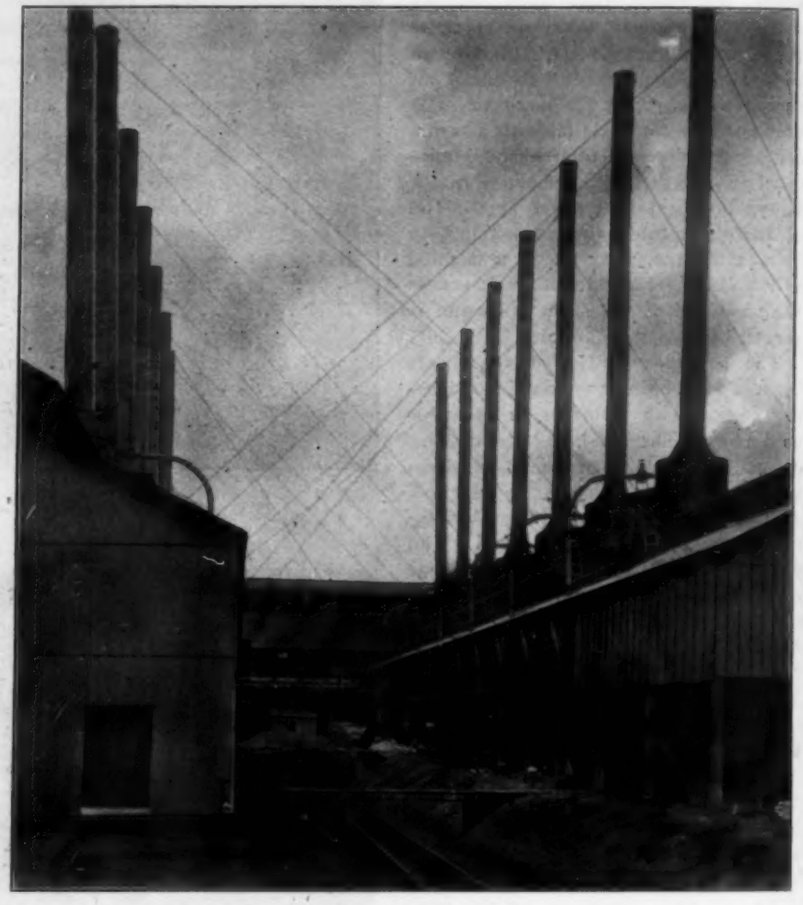


FIG. 12.—THE PUDDLE MILL AND WASTE HEAT BOILERS.

The capacity of the No. 1 lap-weld department, normally, is pipe two to eight inches in diameter, and of the No. 2 lap-weld department, pipe five to twelve inches in diameter, though with slight changes, pipe as large as sixteen inches in diameter can be made.

The bell-welding department is housed in a building 200 by 90 feet and contains two sets of welding furnaces. Tables convey the skelp from the skelp yard to the furnaces, as in the lap-weld department. The two furnaces are located side by side, a short distance apart, one of them being for pipe one inch to three

inches diameter, and the other for pipe ¼ to 1½ inches. After passing through the furnaces and the welding bell, the pipe pass through sizing and straightening rolls and then are delivered to a transfer and cooling bed, which delivers them to a conveyor leading to the threading department.

The fuel used in all the furnaces in the tube mills is producer gas. The producers are located in a building, 189 feet 9 inches by 26 feet, to the north of the lap-weld building. Seventeen producers are installed, twelve of them being Laughlin, single type, two Duff double-hopper, and three Morgan producers.

South of the bell-weld shop is the socket shop, 200 by 60 feet, in which the couplings for the pipes are manufactured. The equipment of this shop comprises a gas welding furnace, two Bradley hammers, a roller welding machine and two steam hammers of 600 and 1,200 pounds, respectively. The sockets are tapped in nine vertical tapping machines of various sizes and capacities, some of them being four spindle and others two spindle machines. In addition to these various machines, there is installed, at one end, a bank of lathes for recessing the sockets. Such sockets as are to be galvanized pass into the galvanizing plant directly south of the socket shop, while the others go to the threading department and are screwed on the pipes.

The galvanizing shop is a building 200 x 51 feet and contains two galvanizing tanks and five pickling tanks in which galvanizing is done by the ordinary hot process. The pipe are handled in this shop by a set of electric trolleys.

In the east end of the galvanizing shop is the tube mill machine shop. This is very completely equipped for taking care of all the tube mill repair work, and especially tap and die work.

FIG. 13.—LAP-WELD TUBE MILL.

Threading Department.

The threading department of the tube mills is located in a building west of the tube mills and which extends across the entire end of the tube mills, socket shop and galvanizing department. Its dimensions are 480 by 120 feet. It is divided into two departments for lap-weld threading and bell-weld threading, respectively. The lap-weld department occupies the greater portion of the space. The pipes are brought in, as before noted, on conveyors and are delivered to a turn table, which presents first one end and then the other to an R. S. Newbold cutting-off shear, which crops the ends of the pipe. There is one of these machines in each of the departments.

The bell-weld threading department is equipped with fifteen pairs of threading machines arranged along opposite sides of the floor. A series of skids extends the length of the department, between the machines, on which the pipes are rolled. One end is threaded in a machine on one side of the building and the pipe is then shifted and the opposite end threaded in the corresponding machine on the opposite side. After being threaded, the sockets are screwed on by machines, and then the pipes are placed in the testing apparatus and tested hydrostatically up to the required pressure.

The arrangement of all the departments is similar, the principal difference being in the size and number of machines. All the machines are driven by individual electric motors, the absence of belts being noticeable. The lap-weld threading department occupies the entire north end of the building and also one side of the south end, it thus being about three times as large as the bell-weld threading department. It is equipped with sixteen pairs of threading machines and three hydrostatic testing rigs. The building is served by means of four five-ton cranes.

Pressure is furnished by the hydrostatic testing machines by three pumps located in a pump house between the

tube mills and the threading department. This contains two pumps capable of working up to 2,500 pounds pressure per square inch and one pump of 1,000 pounds capacity.

The pipe warehouse adjoins the threading department at the south end and forms an L with it. Another warehouse adjoins this first warehouse at its west end and extends parallel with the threading building. Shipping tracks run into the warehouses and the pipes can be loaded directly on the cars in the building by means of two five-ton cranes in each warehouse. The dimensions of the warehouses are 80 by 320 feet and 88 by 400 feet, respectively.

FIG. 14.—INTERIOR OF LAP-WELD THREADING DEPARTMENT.

Power Plants.

Steam power is furnished the various departments of the works by three boiler plants situated in different locations. The boiler house, situated just north of the producer building belonging to the steel plant, contains sixteen 500-horsepower Stirling boilers. This plant is entirely new, and is housed in a steel building 424 by 57 feet. Each of these boilers is separate from the others, and each has a stack 150 feet high and 58 inches in diameter. The boilers are fitted with Roney stokers, to which coal is supplied by a Heyl & Patterson automatic traveling elevator and conveyor. The coal is brought in on a steel trestle outside the building and dumped into bins, from which it is fed to the elevator.

This plant is also equipped with a Heyl & Patterson coal crushing apparatus. The boiler feed equipment consists of two duplex-compound Epping-Carpenter boiler feed pumps 12 and 22 x 13 x 24 inches, each capable of taking care of 10,000 horsepower boiler capacity. There is also installed in this boiler house one 15,000 horsepower feed-water heater built by the Pittsburg Heater Co.

The boiler house just north of the skelp mills contains ten 345-horsepower hand-fired Stirling boilers. The third boiler plant comprises the fourteen 150- and the one 250-horsepower Cahall waste-heat boilers, surmounting the puddling furnaces as heretofore described.

The ashes are removed from all the Stirling boilers in the plant by means of a subway extending underneath the boilers. The ashes fall into cars in the subway directly from the grates. All the boilers in the three plants are connected, so as to form a single steam system for the entire works, furnishing steam at 150 pounds pressure.

Electric power is furnished to the various mills from a central power plant, which is located just west of the old Stirling boiler plant. It is installed in a brick building 90 by 55 feet, and comprises three engines, two of them being Tod, cross-compound, condensing, 17 and 34 x 36 inches, direct connected to two 400-kilowatt, Westinghouse, 250-volt, direct-current generators. The remaining engine is a Tod-Corliss, cross-compound, condensing engine, 26 and 54 x 48 inches, direct connected to a 800-kilowatt, 250-volt, direct-current, Bullock generator. This building is spanned by a 15-ton Maris hand crane.

All the engines used throughout the works are condensing. With the exception of the reversing engines driving the blooming mill and plate mill, the condensing is done at two central plants, known, respectively, as the No. 1 and No. 2 condensing houses. The location of these buildings is shown in the plan of the works. The No. 1 condensing plant condenses the exhaust from the engines in the skelp mills and power house. Its

equipment comprises a Worthington surface condenser with 6,000 square feet of cooling surface. The air and circulating pump in connection with this condenser is 15 x 24 x 28 x 30 x 24 inches. In addition, there are two Epping-Carpenter duplex boiler-feed pumps 12 x 8 x 16 inches, feeding the ten 345-horsepower Stirling boilers, and there are also two pumps for furnishing hydraulic pressure for the tube and skelp mills, in connection with an 18-inch accumulator. These pumps are of the Epping-Carpenter, compound-duplex type, 18 x 30 x 8½ x 24 inches. A 3,000-horsepower Cochrane heater in this building furnishes hot water for the boilers. The condensed steam is returned to the boilers, the oil being removed by a Cochrane oil separator.

The No. 2 condensing house contains two boiler feed pumps and a feed water heater exactly similar to those in the No. 1 condensing plant, which furnish the water for the waste heat boilers installed in the puddling mills. This plant is equipped with an Epping-Carpenter surface condenser with 4,000 square feet of cooling surface and a Cochrane oil separator.

The bar and billet mill engines exhaust into a Weiss condenser, of the same type as used in connection with the blowing engine and hydraulic pumps. These condensers were furnished by the Southwark Foundry & Machine Co.

Transportation Facilities.

The transportation facilities in the plant are furnished by standard gauge and 36-inch narrow gauge railroad tracks, and by a very complete crane service, extending through the yards and the buildings. The location of the tracks is shown clearly in the accompanying plan. The standard gauge tracks are used for receiving and shipping material, while the narrow gauge tracks solely are used for intercommunication between the various departments, motive power being furnished by three narrow gauge locomotives.

Repair Facilities.

The plant is completely equipped for doing its own repair work by a group of shops located about at the center of the works. These comprise a thoroughly equipped foundry, machine shop, blacksmith and hammer shop, boiler shop, pattern shop, etc. As they are a necessary part of every large works, and as they do not differ materially from similar repair shops in other establishments, a lengthy description of them will not be given.

The Sanitary Ice & Cold Storage Co., of Johnstown, Pa., has been formed to build a large plant. It has $100,000 capital.

FEATURES OF EXPORT TRADE.

A number of important features of our export trade in machinery are pointed out in a recent consular report which seeks the reason for the fact that, while the "United States makes the best machinery, Great Britain sells the most." Machines and machinery constitute our premier export, the total valuation for 1904 being $82,078,000, which is the largest line of export of any country save Great Britain, which in that year sent out machinery to the value of $102,531,800. This is explained as chiefly due to the fact that British interests naturally predominate in British India, British South Africa, Australasia, Egypt, the Straits Settlements and a large number of small island markets. Owing to their proximity, England, Germany and France also secure more than a proportionate share in the trade of Russia, Spain, Norway, Sweden and other European states.

Due to its prestige in its colonial possessions, Great Britain exceeds this country in exports of locomotives and other steam engines, with $9,389,400 to its credit for locomotives alone in 1904 against $5,261,400 for the United States. The railroads of Argentina, which are largely under British control, were heavy purchasers in the English market, while on other hand Canadian lines were supplied almost exclusively by American manufacturers. This emphasizes the well established fact that the locomotive first established in a country and which first becomes familiar to the engineers and firemen there has gained an immense advantage. Canadian railroads were built on the American plan; their original equipment included American locomotives and cars, and orders for equipment of new lines and replacements for old have sought the same markets. The situation in Argentina, where British capital built the first roads, has worked out similarly. The moral is drawn that Americans must build foreign lines if they are to expect foreign customers of rolling stock, and as this is being done to a great extent, the outlook for export trade in this direction is bright. Other than in locomotives, our steam engine exports in 1904 were valued at $3,239,200 against $14,550,700 for Great Britain.

In agricultural implement trade a different system prevails. The manufacture of American agricultural machines has sprung from our own necessities, the subjugation of a continental wilderness in less than a century, which the labor methods of the Old World would not have accomplished in a thousand years. Our most severe requirements have been fulfilled and it naturally follows that the benefits of our experience—in the shape of the most improved agricultural machinery ever devised—should be generally shared. Accordingly, our exports of agricultural machinery in 1904 were valued at $22,749,700, against only $5,263,800 by Great Britain. The most advanced agricultural countries, Argentina, Canada, Russia, France, Great Britain, Australia and Denmark, were the heaviest customers. In fact, the greatest drawback to the universal acceptance of our agricultural machinery is the widespread ignorance of its existence, in the first place, and secondly of its proper handling and use.

Though sewing machines are an American invention, Great Britain has made such rapid strides in their manufacture that our exports are only about half those of that country. In the textile industry Great Britain has a practical monopoly, for the reason that out of its own wants it was forced to design and develop this class of machinery and consequently for many years met with little competition in their manufacture.

In electrical machinery exports of the United States in 1904 were valued at $7,409,200, about threefold those of Great Britain. Canada, Japan and Mexico were the leading purchasers. "Unless some power superior to electriacal energy should supervene," says the report, "electrical machinery and electrical appliances of all kinds will dominate the industrial future. It therefore only remains for American electricians to cater to the world's requirements to hold the lead they have already won in this great branch of the machine industry."

Under the grouping of "machinery special to the United States," the consular report lists the following classes of machines, together with the value of exports in 1904: Cash registers, $1,830,200; laundry machinery, $553,900; metal working machinery, $3,716,700; printing presses, $1,396,700; pumps and pumping machinery, $2,703,400; shoe machinery, $1,071,900; typewriting machines, $4,537,100; a total of $15,809,900. If the United Kingdom manufactures any similar machines for export the fact is not recorded in its official publications. As, however, the United Kingdom is the largest consumer among the nations of these machines—our export thereto in 1904 amounting to $4,733,300, or 30 per cent of the whole export—it would tend to show such machines are not manufactured therein.

MATERIAL: PURCHASING DEPARTMENT.[1]

BY F. E. WEBNER.[2]

The function of a cash book is to record and show accurately the receipts of cash, and also the disbursements of cash, and in the more advanced plans of accounting, statistical information is reduced from the records regarding the sources and volume of cash received and the various classifications of expenditures; such statistics are of vital importance to the management in the conduct of the business of the concern. Much stress is usually laid upon the rule that the cash on hand or in bank or both together must agree with the balance as shown in the record. Incidentally it too often occurs that in the till, in lieu of cash, yet accounted as cash, are found numerous evidences of indebtedness which have very little value as debt paying assets and which, with very few possible exceptions ought to be treated otherwise than as cash. Modern business practice has not much room for sentiment nor should it have any outside of a broad and fair policy to give full measure and to demand full measure in return. A person handling cash may proceed for years in most strict honesty purely on principle and yet there may come a time in his history when temptation seizes him and his honesty becomes a matter of policy and perhaps eventually he yields to the glittering temptations which present themselves and he, more or less nervously, takes the first step which may result in his ultimate downfall or at least in the destruction of that high confidence, and esteem in which he was formerly held. Far too often do the daily papers tell us of good men gone wrong and yet what heartaches might have been spared in individual cases if the work of the misguided unfortunates had but been subjected to periodical scrutiny by disinterested persons duly qualified for such work thereby keeping the victim of temptation at least in that class which follow honest methods merely as a good policy if not on principle.

Protection from Peculation.

There is no system which will make men honest but systems can be devised to make it a difficult matter to divert assets without detection and every business man owes it to himself and his concern to so hedge about the work of trusted employes as to keep such assets from possible peculation, thereby safeguarding the concern against loss and at the same time insuring the continuance of a high degree of efficiency on the part of all concerned.

In Revolutionary times the soldiers were admonished to put their trust in heaven and keep their powder dry; in these piping times of peace the wise manager has confidence in his trusted employes, and in order that such confidence may remain undisturbed he takes out an indemnity bond in a good company and at intervals he has the books audited primarily for his own protection and secondarily for the satisfaction of the indemnity company which requires it.

The subject of this chapter is material and more particularly the relationship which the purchasing department bears to a cost system. In a successful concern cash at one stage or another is a prime prerequisite to be considered in connection with the acquiring of all three of the producing elements, viz., material, labor and expense and the thought in leading the reader through the preliminary discourse on cash, is to compare with cash those producing elements for which the producing concern parts with cash and with the idea that the cost system is the tool with which producing costs are to be cut down; the ways and means thereof are to be specifically treated in this article and those which are to follow.

Logically the producer parts with cash (or its equivalent), for material and yet too often do we find that when such an exchange has been effected the assets in their new form have not the same magnetic influences surrounding them, and really too little thought is given to safeguarding them. All business is a conversion of assets, the ultimate purpose of which is, in the great majority of cases, the final exchange into that form of asset from which the process started, namely, cash (or its equivalent) and while in the metamorphosis the successful manufacturer or producer succeeds in producing more cash than he originally had, it cannot be likened to the getting of something from nothing for the reason that the increment represents the "knowing how" element which after all is the standard by which producers are gauged to a large extent by their bankers. It may be considered as a barometer indicating to what degree are used the details of a knowledge concerning the primary producing elements and in any event it is a most important adjunct to production of any kind.

A Stock Ledger.

A fundamental principle in the finding of costs is the maintenence of a stock ledger, such as is commonly known as a "going inventory." This plan presupposes that material is valuable just as cash is valuable, and while it is not generally the vogue, it should be that when the stock on hand in individual cases does not agree with the records, the difference should be located; such a difference may result from any one of a dozen different causes and may even emanate from the purchase department, but in each case the effect will have been precisely the same; that is to say, a difference will exist, thereby affecting costs and in such cases as make it seemingly impossible to proceed without such differences, a percentage of variation must be determined by actual practice and the variation kept down to the minimum by careful attention at the point where the differences are brought about. Such differences are not infrequently brought about through stealth, and if by stealth not necessarily that the material may be removed from the plant but that spoiled parts may be replaced without the knowledge of superiors.

Picking for Thieves.

Every machine shop man knows that brass castings are particularly good picking for thieves and precautions are usually taken to prevent open theft in the shops; the stock records, however, are to be kept not alone for disclosing thefts, but for a score or more of diversified purposes some of which will be specialized in following articles. It is particularly desired to impress upon the reader, however, that material is equivalent to cash, and ought by all means to be as much safeguarded against misuse and peculation as cash. If material is worth anything at all, it is worthy of record. The purchasing department performs a most important part in the matter of cost finding and from an economic view point, the purchasing department should be given the same close scrutiny that the cash department has, yet the temptations which come to the purchasing agent are through entirely different channels than the temptations of the cashier, and in a way any shortcomings are very much more difficult to locate. A conscientious purchasing agent will refuse all gratuities from a seling concern, or its representative, while a sharp, dishonest one will accept them in peculiar but none the less effective ways, as for instance the pass-

[1]Second of a series of twelve papers on "Cost Keeping."
[2]Certified public accountant, Cincinnati.

ing of money in purposely lost card games, the acceptance of valuable presents ostensibly from a coterie of neighbors, etc., and incidentally the chances for dishonesty rest not alone with the head of the department. A case comes to mind wherein a receiving clerk was working in collusion with a driver, or drivers and, covering a period of upwards of five years, the receiving clerks' employers were robbed of a considerable amount of money, through the weighing of goods and certifying to the receipt thereof, and then deliberately throwing back onto the wagon one or more packages of the commodity, a part of which may or may not have been considered as rejected goods, and credited back by the seller accordingly as to whether or not any observers were at hand, but in any event money was eventually handed to the clerk as his share in the results of the crime. This systematic thieving was disclosed after the advent of a running stock account, the operation of which puzzled the clerks whenever balances were tried out until finally grave suspicions were aroused and a close watch kept on different persons, resulting in the trapping of the culprit in the act and his subsequent confession of past offenses. Excessive prices paid for, or losses of material, no matter from what cause, means increased cost of production.

It is not the purpose of the writer to touch at length upon any phase of the purchasing department not directly concerned in the cost of product and therefore the various and several ways for handling the quotations on commodities will be left largely to the arguments of the many office supply houses, almost any one of whom have some one or more devices of real merit. Sectional book cases and drawer units are the ideal thing for catalogs; a good plan is to give each unit a designating letter A, B, C, etc., and each drawer or compartment thereof a number 1, 2, 3, etc. Having placed the catalogs, price sheets, etc., satisfactorily in the book cases or drawers either by size or classifications as desired, it is well to institute an exhaustive index thereof both by firms and commodities; for this purpose the card index is most flexible. A card can be given to each concern whose catalog is in the file or, if desired, the sheets or cards which contain prices and commodities can be used also for the catalog index. The location of the catalog is to be designated by the section and drawer number, as for instance, D3, G6, A2, etc.

Each catalog or price pamphlet should have neatly stamped upon its face or inside cover the impression from a specially prepared rubber stamp as follows:

This belongs in the catalog file under section.... drawer....
Return without delay.

A strict observance of this rule will enable anyone concerned to find what catalog is wanted with very little delay.

Incidentally in the marking of books, not only catalog but in one's private library, it is a good plan to determine upon a certain page number and mark all books on that page as well as elsewhere. When a question arises as to the ownership of a certain book either the name on the chosen page or the absence of the page entirely will tell the story.

The Initial Work.

In the indexing of commodities, sizes, shapes, etc., etc., the initial work presents a considerable task, but the cost therefore is amply repaid by future convenience. Once installed the index can be added to as new catalogs are received. This index can show also the location of catalogs and it then becomes possible for any one in authority to say to a subordinate "I want all catalogs showing copper oilers" without having to rack his brain trying to remember all such catalogs which he thinks are on file.

The general plan advocated as a purchase order is simple in form and may be worded to suit the fancy of the user; it is, however, suggested that it bear a consecutive number with the request that seller show such number in the invoice. This feature has now come to be very commonly used and the request is quite generally respected, especially after the return of one or two invoices by the buyer where such data is lacking.

Four copies of the order can be made by the carbon process on a typewriter; the several copies to be utilized as follows:

1. Delivered to seller.
2. Placed on file consecutively.
3. Placed on a temporary "unfilled orders" file.
4. Delivered to receiving department.

Where it is desired to hedge the plan closely with safeguards the four copies can be printed on one sheet and perforated; Nos. 1 and 3 would then appear on one side of the sheet and numbers 2 and 4 on the other side in such manner that when folded for the manifolding process the consecutive copies would be in sequence and would register. By having the sheets machine numbered and padded and having spoiled copies destroyed by no one but an officer or a department head and then such destruction tersely recorded on copy No. 2 which ought not to be destroyed but kept in the consecutive file so that positively all sheets are accounted for, the plan precludes the possibility of issuing promiscuous purchase orders without the disclosure of any possible irregularities by subordinates.

The Various Copies.

Where all copies are not made on one sheet, the various copies can be on different colors of paper, which makes them the more readily distinguishable, yet with the different copies having different printing upon them there is, as a rule, no trouble experienced from that source. Copy No. 1 can be any commonly used form of purchase order, but care must be exercised in devising it to economize space and to so group the spaces where data are to appear that such data will be advantageously shown on all four copies, which copies are to show somewhat different printing matter in each instance.

Copy 2 instead of reading as an order can recite the fact that an order has been placed with the parties named for the goods named at the prices shown; all the written matter appearing in copy No. 1 to appear also in copy No. 2. In addition to printed matter mentioned, printed spaces can be arranged for recording the subsequent transactions in the matter such as for instance "Date of Acknowledgement," "Date Goods Promised," "Date Goods Received," "Date of Invoice," "Invoice of Approved by," etc., etc., making out of the file positive, full and complete history of each and every purchase order and preventing the paying of two invoices for the same goods. The clerical operation of recording such dates and other relevant data does not run into time if done systematically by accumulating a number of invoices first before starting to record them; perhaps once each day making one job of it according to the way in which the work of the department is arranged. Copy No. 2 ought never to be removed from the file under ordinary circumstances.

Copy No. 3 can be similar to copy No. 2 except perhaps to have the reading matter printed in a different style of type so as to present a different appearance. A good plan is to have a large designating figure in the corner of each different copy. Except for "Date promised" copy No. 3 need have

no spaces for recording dates, etc., as the plan is to have it placed on an unfilled order file awaiting receipt of goods after which it can be removed and be attached to the invoice or be finally disposed of according to one or another of the plans to be presented under a later article. In cases of partial fulfillment of orders, the articles received can be indicated plainly and the copy left on file for further receipts of goods called for.

Copy No. 4 can be made to read in a manner so as to instruct the receiving clerk that on or about the date mentioned he may expect a shipment from the concern named. On this copy a short carbon can be used in a manner to prevent the showing of quantities, thereby making it necessary for the receiving clerk to weigh, count or measure all receipts of goods. This copy can, if desired, have upon it somewhere a certificate that the goods have been received by the storekeeper or by the foreman in cases where goods are delivered directly to the department for which purchased. The final resting place of this copy can be whereever in individual cases it will do the greatest good, depending entirely on local conditions.

Registration.

All requisitions for the purchase of special or standard material issued by the store room clerk or others should first pass through the material division of the cost department for registration. In almost all cases it is advisable to have a material ordered register maintained, the columns of which to be so devised as to prevent synthetical and statistical information regarding physical rather than financial conditions concerning grades, weight, measures, quantities, etc., etc., and which should in connection with classified details on the stock ledger give the management a close insight into the synthesis and analysis of any material proposition which might arise in the conduct of the business.

Following this general plan all material wants or more particularly all material *needs* would, through proper channels, be made known to the material division of the cost department (which may or may not be designated by another name, yet be the same in effect) and if by reference to the stock records it might be found necessary to purchase, then a request for purchase might issue from the material division to the purchase department. Upon the superiority of department heads or the internal organization of the forces would depend entirely whether or not such a request did or did not bear information regarding number of units on hand at present, number needed for immediate consumption, number already ordered but not yet received, etc., etc.; in short, it would depend upon whose judgment rested the purchase; yet, as an article of this kind cannot possibly be made so elastic as to fit all the individual cases, it is assumed that the chief of the material division has sufficient latitude either in his own capacity or through consultation with superior officers to issue such purchase requests. The form for these requests can be a simple statement of the fact that certain goods are needed having such request issued under a consecutive number, which number is to correspond with the entry in the material ordered register and such number will be used in purchasing department for identification purposes.

The summarized material information disclosed by the material ordered register may be likened to the cash summary disclosed by the cash record touched upon at the beginning of the article.

Form of Ledger.

The department in which the stock ledger is actually kept is really not a matter of great moment, yet in many cases it has seemed wise to have it in close proximity to the purchasing department for ready reference. The form and shape of the ledger itself is entirely optional with the users; in some very few cases a bound book can be used, but where the various shapes, sizes, weights and numbers of units run into the thousands the bound book is prohibitive and in its stead is used either the loose leaf or the loose card and under ordinary circumstances the latter is preferable for quick handling and the lack of friction in its use. Briefly, cards are in a way like fire in that both are good servants but bad masters. If cards are used stringent rules must be observed touching upon their usage and if a card is removed from the files a dummy must invariably be left in its place; if this is done a successful use will follow the installation, but if a haphazard, happy-go-lucky use or misuse of the cards is permitted, misplaced cards and ruffled tempers will be the sure result. Loose leaf ledgers naturally prevent two people working thereon at the same time, but they have the feature of being in place when wanted whereas cards being more portable are oftentimes on some other man's desk, yet with all the pros and cons as between cards and loose leaves the writer strongly advocates cards.

The detailed material information recorded in the stock ledger will be in four groups, namely, "Material Received," "Material Issued," (or parted with), "Balance on Hand," and "Material Ordered," also at the top of accounts the minimum quantity to be carried. Under "Material Received" should be the following named columns: "Date," "From Whom," "Order Number," "Price Per Unit," "Quantity," "Total Cost." Under "Material Issued" should be the columns for "Date," "Requisition Number," "Price," "Quantity," "Total Cost." Under "Balance Column," "Date," "Quantity," "Average Price of Units on Hand," "Cost," "Verified by Physical Count" (yes or no), "Amount of Difference" (over or under). The "Material Ordered" group to show: "Date," "From Whom," "Requisition Number," "Quantity," "Price," "Date," "Quantity Received" (Items in this column will agree with "Material Received" column).

In cases where goods such as malleable castings, for instance, are ordered from outside concerns for future delivery it is in many cases possible to have the foundry furnish reports at intervals showing the different stages at which the ordered goods have arrived, which makes it possible to plan intelligently by being enabled to order certain goods pushed ahead of others instead of being absolutely at the mercy of the foundry to furnish any or all or none as they see fit. Such a foundry form can be very simple and consists of slips A and B headed respectively. (A). "The following patterns have been ordered put in the sand for number of castings as indicated" and, (B) "The following castings have been placed in the annealing process." The sheet or book to be kept in the purchase or material department can be so arranged as to give a page or more to each pattern number and show columns as follows: "Date Ordered," "Quantity" (showing thereunder both a debit, credit and balance column); "Cast" Debit, Credit and Balance; "Oven" Debit, Credit and Balance; "Grand Total Undelivered."

The operation of this book will be to enter under "Ordered Debit" the date and quantity ordered; as slips "A" are received the items thereon can be ordered in the respective accounts under the pattern numbers indicated showing the quantity both in the "Ordered Credit" and the "Cast Debit" columns. As slips "B" are received in like manner they can be recorded by showing the quantities under "Cast Credit" and "Oven Debit." As fin-

ished castings are received from the foundry the quantity can be shown in column "Oven Credit." In each of the cases mentioned the balance remaining in each state will be shown after each entry has been made, also the grand total undelivered, thereby presenting to the person or persons directly concerned a graphic exhibit of conditions. As a matter of clearness of explanations the debit and credit columns are used, yet as a matter of actual practice the "Cast Debit" column and the "Ordered Credit" column can be identical as can also the "Cast Credit" and the "Oven Debit" columns.

In closing the writer will express it as his experience that in those shops where mtaerial is most carefully accounted for the sales of scrap and waste are always the lightest, and the general appearance of the shop always the best, which cannot do otherwise than have a salutary effect on the work of all employes from the purchasing of goods to the finishing of the product.

At times the details may seem fussy and tedious and wrapped up in red tape; perhaps it is red tape, but, if the methods are the proper kind, it is red tape that pays.

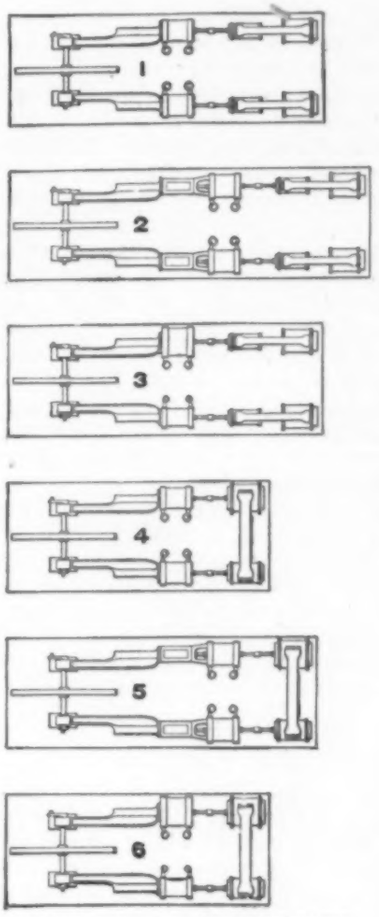
Welsh Tin Plate Industry.—Consul D. W. Williams, of Cardiff, reports that the conciliation board of the Welsh tin plate industry held its annual meeting June 14 and renewed the present wage agreement for another year. The wages are almost at a minimum, but owing to the depression in the trade the men did not feel justified in asking for any increase. All the tin mills, with few exceptions, closed during the first week in June in order to reduce production, but the stop-week failed to strengthen the market. There was an increase in the exports to America during May, but it is feared that the disturbance in the tinned-meat industry will reduce the exports greatly during the next quarter. The American market is the cause of much concern to the trade. In 1904 the United States bought 20 per cent of the Welsh exports. The demand fell away in 1905, but the loss was only about 7 per cent of the total exports. The situation in 1906 is much more serious, for the exports to the United States during the first five months show a loss of 7,637 tons, a decrease of about 25 per cent as compared with the corresponding period last year, leaving the American demand at only 13 per cent of the total exports.

DUPLEX AIR COMPRESSORS.

BY TECUMSEH SWIFT.

I am tolerably familiar with "write-ups," and there seems to be a plenty of them, and I can understand pretty well the why of them. Just now I am anxious to find out about "write-down;" what they are for and what is intended to be accomplished by them.

The cut herewith, which I have seen



VARIOUS FORMS OF AIR COMPRESSORS.

lately in more than one technical journal, accompanies and is intended to illustrate and explain a "write-down" of the duplex air compressor. It is a wonder to me in the first place that any one could write such a thing, and in the second place that it could appear on the page of a reputable and well informed journal; but there it is.

I might as well speak straight out what I think about the matter. The article from which the above cut is taken is not signed and nobody apparently is responsible for it, except as the editors endorse it by publication, but it seems to be put out in the supposed interest of builders of air compressors which are not duplex, the assumption apparently being that anything derogatory to the duplex is necessarily an endorsement of the straight line, or any other old machine.

Those who are familiar with the best air compressor practice of the day do not need to be told that in all the large and more or less permanent installations of air compressors, and in all the plants where the best steam economy and the most absolute reliability of service are sought, the air compressors employed are precisely those which are attacked in the article here referred to: Corliss cross-compound, steam condensing machines.

Of the 80 air compressors now running day and night upon the tunnel and railroad work in and around New York City most of them are of this type. It has been recently computed—the figures can be produced—that one of these compressors, Corliss cross-compound condensing, in its economy of steam as compared with the steam consumption of Meyer slide valve, straight line compressors, considerably more than pays for itself in a single year.

The cut herewith is said to represent the six different types of duplex air compressors with compound air compression. These are:

1. Twin tandem-compound air cylinders and twin simple steam cylinders.
2. Twin tandem-compound air cylinders and twin tandem-compound steam cylinders.
3. Twin tandem-compound air cylinders and cross-compound steam cylinders.
4. Cross-compound air cylinders and twin simple steam cylinders.
5. Cross-compound air cylinders and twin tandem-compound steam cylinders.
6. Cross-compound air cylinders and cross-compound steam cylinders.

The collection either indicates that the compiler is not accurately informed as to air compressor practice or it must be taken as a fine example of the ingeniously disingenuous. These six different combinations are of course all possible, and samples of each may have been built, but we are talking here—or what's the use of talking at all—rather about the actual machines of the present and the immediate future, about machines now to be built and sold; and who would build, or who, sufficiently informed, would buy *duplex* machines with *tandem* compound cylinders either steam or air, four cylinders to do the work of two, or, as in No. 2, eight cylinders to do the work of four? We have to do, therefore only, with No. 4 and No. 6, as representing the now possible machines.

One charge made in all apparent seriousness against the duplex machines is that if any part of a machine is so deranged as to make stoppage necessary, the entire machine must stop. Is not this equally true of all straight line machines? If the steam cylinder gives out, the air cylinder can't run. If one connecting rod box heats up and melts the babbitt out, you can't run with the other rod.

The duplex machine is a single machine, as much so as the straight line machine, except that it is usually a larger unit. The duplex machine often represents the capacity of three or four straight line machines, and for probability of stoppage for repairs or replacement, the one is properly only comparable with three or four of the other, instead of with a single one.

Not long ago I was privileged to make a tour of all the compressor plants employed on tunnel and railroad work in and around New York where the 80—the precise number—of compressors spoken of are running, and not one of these machines was out of order or undergoing repairs. Nearly every one was running up to or above its full rated capacity, and every one not so running was ready to start at any moment if required.

This talk about the probability of stoppage for breakdown or derangement might well originate with the builders of an inferior line of compres-pressors, it being their familiar experience; but, as a matter of fact, while the work of the air compressor is onerous, the standard machines are built to meet the conditions, and breakdowns, derangements and stoppages for repair are much more frequent, and, in the bulk, much more costly for the common straight line than for the high class duplex machines.

"The generally observed friction of the duplex machines," it is said, "exceeds by about five per cent the friction of two machines working separately." I understand that the capacity of the two machines here referred to is equal to that of the one duplex machine. As to the friction of the machines, everybody except the writer of the above knows that precisely the reverse is true. Richard's "Compressed Air" says that the friction of large Corliss duplex machines is often less than five per cent, while that of straight line compressors is seldom less than 10 per cent, conclusions deduced from numerous sets of indicator cards and which have gone unchallenged for ten years.

"For any given output of air they are more expensive in the first cost and upkeep." This, too, is misleading and as to the upkeep true. The machine represents a little more expense at the beginning to make a larger profit all along. The larger cost of the compressor is largely offset, anyway, by the smaller boiler cost.

It is not necessary to reproduce here the plans of the straight line compressors which accompanied the others to show how much less floor space is occupied by the straight line machine. These machines are not planted in Wall street, but usually where land costs nothing and roofs and floors but little. The habit which the duplex machines have of insisting upon sufficient floor space to make every part of the machine perfectly accessible when in operation, and for getting or taking out any part without disturbing the rest, is one of the best things about them. The straight line machines are crowded together and internally inaccessible enough at the best, and the way in which they consent to be stuck away in dark and dirty corners, inviting contempt and neglect is a most deplorable characteristic. I do not willingly say anything against the straight line machines of any make, for they have been the pioneers and have done excellent work in promoting and establishing the compressed air industries, but the machine of today is also to be respected, and certainly deserves to be protected from misleading misrepresentation. It may be well to remember that a "write-down" of any machine is not usually a "write-up" of any other.

The National Association of Master Sheet Metal Workers of the United States will convene at Indianapolis, Aug. 8, with a large attendance already assured. Convention headquarters will be at the Denison House, which has a convention hall and provides ample display room. Space for exhibits of tin, stove and heating lines is being reserved by Albert H. Weinland, 942 Fort Wayne avenue, Indianapolis.

The Western Foundry Co., which in addition to its extensive works in the United States has large plants in Montreal and Windsor, will establish a branch in Winnipeg. It has purchased a site comprising three and a half acres south of the Canadian Pacific railway shops. S. H. Jones, president of the company, has been in Winnipeg for some days in conection with the deal and is favorably impressed with the opportunities of Winnipeg as an industrial center.

WORK SUSPENDED

At the Riverton.—Empire Being Opened.—Other Operations.

(Special Correspondence.)

Iron Mountain, Mich., July 26.—The Steel Corporation recently suspended operations at its Riverton property at Iron river, and it looks as if it is through there. The pumps have been pulled, and the skip tracks and other underground equipment removed. The mine has been operated under lease. It is pretty well worked out below the fifth level. Above that point there is still considerable ore, but on account of the close proximity of the waters of Iron river overhead it cannot be mined with safety. In fact, it was possible to mine much of the ore already shipped only because at both the Dober and the Iron river ends of the Riverton property the waters of the stream were deflected to protect the openings. This was done in 1900 by the construction of canals by which the flow of the river was diverted into new channels, a dyke built to protect the mine in case of overflows from floods affording additional security. It was not proposed by the company to be *particeps criminis* to any such horror as that which occurred at the Mansfield mine when the Michigamme river broke through the roof of the mine.

The Mansfield Catastrophe.

This disaster at the Mansfield, located seven miles east of the city of Crystal Falls, county seat of Iron county, was the greatest fatality ever known in a Lake Superior iron mine, and the mortality has been exceeded but once in any Michigan mine, that happening just two years later, when thirty men and boys were suffocated by gas from a fire on the twenty-seventh level of No. 3 shaft of the Osceola copper mine at Calumet. At the Mansfield, the shaft was sunk in the hanging wall because it was impossible to sink on the footwall without building a cofferdam in the middle of the Michigamme river, a considerable stream and subject to high water in the spring freshets. A fine mine was opened and the first ore shipped in 1890. In September, 1893, owing to extremely careless mining, the openings were raised under the bed of the river, in following a rich vein of ore, so high that the stream broke through, filling the entire mine in less than five minutes and drowning twenty-eight miners like rats in a trap. The Mansfield was idle after that calamity until 1896, when new interests took charge and diverted the river to a new channel for a distance of a quarter of a mile, permitting the unwatering of the workings. The property is now operated by the Steel Corporation, which is min-

ing through a new shaft, some distance away from the old one. Only two of the bodies of the twenty-eight miners drowned have ever been recoverd.

The Buffalo & Susquehanna Iron Co., which has an option on the Hiawatha mine, located near the Sheridan, has sunk the shaft another level, and is engaged in drifting, the results from which will probably determine the future of the property or at least whether a permanent lease be taken by the present option holder. The Hiawatha has been in the hands of several concerns, among them the Victor Schlitz Mining Co. of Milwaukee, which is still interested, and was last operated by the Thomas Furnace Co. It has been out of business since May, 1904. The mine was a fairly good proposition in the years gone by, although it produced a non-Bessemer ore, found in small, irregular lenses, and the indications for its future development are encouraging.

Using Diamond Drill.

The Ross-Barras property, south of the Konwinski, also is being tested by the Buffalo & Susquehanna Co., which is using a diamond drill in the work. The drill is likewise in commission on the Aronson tract, in the same vicinity, having replaced a churn drill when the latter got into the black slates. Still another drill is operating on the Soderquist property, east of Sunset lake, where an Iron river syndicate, including E. S. Coe, F. A. Morrison and associates, recently commenced exploratory work which it is planned to extend to other properties controlled by the pool as time progresses. Corrigan, McKinney & Co. have recently taken options in the same territory, to the north of Iron river, and as soon as machinery can be taken out, a test will be made of the lands. The Steel Corporation also is extensively interested in the new field, having several thousand acres there, and eventually it will explore the various tracts.

The new ore dock of the Milwaukee road at North Escanaba is shipping ore, although at present writing only the north half of the big pier is in commission owing to the fact that considerable dredging remains to be done on the south side of the structure. Dredging is in progress. A slip sixty feet in width has been cut out along the north side. The new dock is one of the finest and largest on the upper lakes.

Empire Being Opened.

At the Empire (Marquette range) property of Mr. Jones, the mine is being opened for operation on the milling system. It will be some time before ore is shipped, however, as it will be upwards of a month before the mine will be provided with railroad facilities. These will be furnished by the Chicago & Northwestern Co., which is now extending a spur track to the property. Until this line is completed it will be impossible to equip the Empire with its permanent plant of machinery, the team road being inadequate for the transportation of heavy material. Included in the equipment will be an ore crusher. The hoisting shaft of the mine has been sunk, as has the winze, through which the ore will be milled. The shaft is a fine one, 6 by 12 feet in dimensions and of three compartments. The ore body will average about 45 per cent iron, and from present indications is capable of large development.

BRITISH MANUFACTURE OF IRON IN 1905.

The total output of puddled bar in the United Kingdom in the year 1905 has been ascertained by the British Iron Trade Association to have been 938,558 tons, which compares with an output of 936,228 tons in the previous year and with an output of 950,393 tons in 1903, showing an increase of 2,330 tons on the output of the former, and a decrease of 11,835 tons on the output of the latter year.

An examination of the details shows that there has been a material increase —27,590 tons—in Scotland, and an increase of 13,502 tons in South Staffordshire, these being now the two principal producing districts. The output of the Cleveland district also shows a very small increase, for the first time for five years.

The greatest falling off appears in the case of Lancashire, but this has been met to a considerable extent by the employment of the mills for the rolling of steel shapes from imported blooms and billets. The tendency is to carry this feature of the trade, which in some districts is a comparatively new one, further year by year. Occupation is thereby afforded to the mills, but the puddling furnaces in a number of cases are only partly employed, although in others they are almost worked to their maximum capacity.

The make of finished iron and steel was 977,091 tons in 1904 and 1,116,850 tons in 1905.

The statistical report for 1904 showed that there were in that year 1,470 puddling furnaces returned as being in existence, of which 1,166 were employed, and 304 were inoperative. The figures collected in respect of 1905 show the total number of furnaces in operation to have been 1,261, while 272 were inoperative, making a total of 1,533. In some cases new puddling furnaces were constructed in 1905, and in others the furnaces were worked irregularly.

NOTES ON CONCRETE CONSTRUCTION.

BY C. E. MARQUE.

It is impossible for any one to tell in the space of a short article what to do and what not to do in concrete construction, as each problem presents conditions peculiar to itself and a description of these problems and the experience gained therefrom constitute the stock in trade of the concrete engineer. There are, however, certain matters which have developed to such an extent that they may be called some of the rules of concrete construction and the following statements may serve as guides to those who are interested in this line.

Naturally the first use one thinks of for concrete is for foundations. In this case the body of the mixture may be made of one part of cement, three parts of sand and four parts of broken stone. In some cases even more broken stone is used. Where gravel is used the mixture sometimes contains one part of concrete and from one to two parts of sand, with from five to seven parts of gravel. In the center of a large block sometimes the proportion of stone or gravel and sand is increased still higher and if the material is thoroughly rammed in, it will harden satisfactorily.

If a hole is full of water, the mixed concrete should never be shoveled in and allowed to settle to the bottom, as during the descent of the material through the water a concentrating action takes place and there will first be deposited all of the large stones or coarse gravel and then succeeding layers of finer and finer sand, and, if the material is undisturbed the cement itself is so fine that it will remain suspended in the water for a long time. Where it is necessary to lay concrete under water, it is sometimes placed in bags as a dry mixture and the bags placed in the water. This of course leaves simply a series of solid masses or blocks having the form of bags, but these have frequently been used successfully in building footings. Where the forms extend under water clear to the bottom, the concrete is sometimes successfully introduced by means of some special shovel or bucket, which is lowered to the bottom before it is emptied. In France some mine shafts have been lined with concrete by using a bucket operating on the principal of a clam shell. The bucket, fillled with cement, is lowered to the bottom behind the metal casing, which serves as a form, and is opened while in contact with the bottom. In this way the concrete settles very uni-

formly and will make fairly good work. Where possible, if it is necessary to go below the water level, sheet piling should be driven or the forms made water tight in some way, the hole pumped out, and the concrete laid in the open. Where large masses of concrete are being built up, as in foundation work, sometimes irregular stones as large as a man can handle are placed and grouted into the concrete. This reduces the cost of material considerably in some cases and still results in good work.

Concrete in foundations is rarely reinforced, though at times where the foundation spans a sewer, is upon uneven ground or must be placed upon ground which is liable to settle unevenly, the mass is tied together with rods. Old steel rails are frequently used for this purpose and they give excellent results, though the amount of metal thus introduced is often far in excess of that necessary.

When the construction of buildings or other works above the foundations is considered, we enter the special field of re-inforced concrete. By re-inforced concrete is meant a structure in which concrete is used to take care of the compression strains, and steel is introduced to take care of the tension and shearing strains. Retaining walls, dams, bins, tanks and buildings can all be constructed of re-inforced concrete much more cheaply and better than of any other material now on the market.

Where concrete is used for fireproofing structural steel, there should be at least two inches of concrete over the steel. For work of this kind the stone should also be crushed fine enough to insure its packing uniformly and there should be enough fine material present to fill all the voids.

For exterior work, or in walls, beams or pillars which are to be exposed the concrete placed next to the face is frequently made simply of sand and cement in the proportion of one of cement to from four to five of sand so as to give a good surface. A layer of this rich concrete is laid next the form and the coarser material tamped in behind it. The tamping of the coarse material will force the richer and finer material to the face and result in a good smooth surface. If the forms are taken off at the right time, the surface can also be treated with a trowel or block to smooth it, though with well made forms this is usually unnecessary except at some of the joints.

For columns a richer concrete should be used than is generally employed for floors, walls, etc., as the richer the concrete in cement the greater the compression load it can carry. It is well to introduce some steel in the column and to place hoops at intervals and especially about its top. An iron or zinc plate should be used on top of the column to receive the ends of the girders. Where partings are required at expansion joints and in some locations, plumbago may be used, the plumbago being mixed and applied like a wet blacking in foundry practice.

We have heard much talk about cinder concrete. In ordinary practice cinder concrete is made by taking the cinders from under a boiler and mixing them with cement. The concrete thus resulting weighs considerably less per cubic foot than stone concrete, but it is proportionately weaker. Cinder concrete is frequently used for floors and in such cases does very well, as on account of mechanical conditions it is frequently necessary to make the slab thick enough so that the cinder concrete is fully able to bear the load. Cinder concrete, however, should never be used for beams or pillars. Also, it should never be used in damp places as it absorbs moisture and deteriorates. Good stone concrete which is fairly rich in cement is practically water proof and if the surface is made with a richer mixture and rubbed down, it will be water proof.

Concrete should not be allowed to freeze during setting, but freezing soon after setting does not seem to injure it. Concrete also should have an excess of moisture present during the setting. Recognizing this fact, an interesting method has been used for the protection of bridge piers which were built during the winter. During the day the temperature was slightly above freezing and the concrete was laid and rammed in the usual manner. To protect it at night the hole was pumped full of water, so that the concrete was covered with three or four feet of water. Sometimes three or four inches of ice froze on top of the water during the night, but the frost never reached the concrete. As soon as the sun was up in the morning and it commenced to thaw, the ice was cut away, the water pumped out and more concrete placed. In this way very good footings or pier foundations have been constructed in the winter.

For building foundations, retaining walls, etc., the concrete is frequently mixed with salt, in some cases a saturated salt solution being used to prevent freezing, and with this class of work no ill effects seem to result from the presence of the salt in the concrete.

In laying concrete in the winter, attempts are frequently made to keep it from freezing during the night by covering it with ordinary stable bedding or manure. This is exceedingly bad practice, since if it becomes warm during the night and there is rain, the acids from the bedding are washed into the concrete and will attack it, making it rotten and useless for several inches so that it is frequently necessary to remove six or eight inches of the surface before solid material is found, and it is then very difficult to know whether or not really solid material has been reached. After concrete has been thoroughly hardened, it is but slightly attacked by acids or acid fumes, but while soft either acids or acid fumes will destroy it with remarkable rapidity.

For preventing concrete from freezing during the winter when it is necessary to carry on construction work in the cold season, there are two methods. The first is to introduce a sufficient amount of salt into the water to prevent the concrete from freezing, and some contractors claim that the salt has no bad effects upon the steel used for re-inforcing, while others claim that the presence of the salt leaves the concrete porous, that the salt itself attacks the steel and that the porous nature of the concrete admits air thereafter to attack the steel, so that the steel re-inforcing will be rapidly corroded or eaten away. As iron during rusting expands, it would naturally place a strain on the concrete and in the case of thin iron, such as expanded metal, it is probable that a failure might result in a few years where the material had been kept from freezing with salt. Where large bars are used it would take a long time to corrode them through, but the concrete construction would undoubtedly be weakened.

The other method of preventing freezing is to keep the work warm. If the work is being carried on in the interior of a building, the building itself may be kept warm. If the work is exposed it may be surrounded with suitable boxing or canvas jets of live steam used to prevent freezing. The moisture in the steam would also benefit the concrete in setting. Concrete should never be kept from freezing with dry heat, which extracts the moisture from it, or if this is done, the concrete should be frequently sprinkled so as to keep it moist.

In ordinary concrete work a barrel of cement is supposed to contain 3.8

cubic feet of cement. A cubic foot of stone should weigh from 90 to 105 pounds and a cubic foot of sand from 95 to 110 pounds. These figures are frequently useful in figuring on concrete construction work.

THE ENGINEERING BUILDING NEARING COMPLETION.

The accompanying illustration shows the present status of the new engineering building being erected in New York

THE NEW ENGINEERING BUILDING.

for the accommodation of the American Society of Mechanical Engineers, American Institute of Electrical Engineers and American Institute of Mining Engineers by Andrew Carnegie. The structure is now enclosed and roofed, the partitions are in place, all structural work is completed, all risers, water, steam, electric, etc., in place, the stairways are in and the elevators running, the boilers are installed and some of the windows are ready to set in. The accompanying photograph was taken on July 3.

BY-PRODUCT OVENS AT GARY.

Although nothing has as yet been officially announced about the arrangements to be made at the Gary plant of the Indiana Steel Co. for handling the fuel supply, it has practically been decided to build 1,000 by-product ovens for the production of coke and fuel gas. If present plans are to be carried out, neither of the two systems in use in this country will be used, but the plant will be constructed according to plans developed by the corporation's own engineers.

The pig iron production in the Cleveland, England, district during the first half of the year showed an increase of 51 per cent over last year and of three per cent over 1899, the previous record period.

THE GAS-PRODUCER AS AN AUXILIARY IN IRON BLAST-FURNACE PRACTICE.[1]

BY R. H. LEE.

Without doubt, one of the most frequent and serious annoyances connected with the practical running of a blast furnace, especially in single-furnace plants, is caused by low steam, in spite of the fact that all boilers at blast furnaces have grates for burning coal, and that coal is more or less continuously burned upon them, three to a dozen men being constantly engaged around the boilers as firemen or coal and ash handlers.

At times, when the furnace is "tight," all available men are put on to assist the regular firemen; yet sufficient steam cannot be got to keep the engines up to their regular number of revolutions, while the stoves, deprived of the gas which has been sent to the boilers, run cold, so that, when the furnace loosens up and resumes the regular rate of driving, the blast is very considerably below normal temperature, and a "cold," or at best a "high-sulphur," cast is the result. Again, it often happens that a furnace, running at its best, becomes temporarily a little too hot; the pressure rises; the amount of gas made is diminshed; the steam soon commences to go down; and a small scaffold is likely to form before the furnace has been brought back to the proper rate of driving, and thus enabled to take its regular amount of blast. The usual remedy is either to "jerk" the furnace by a sudden, brief intermission in blowing, or to cool the furnace by lowering the heat of the blast; but if the lower blast temperature be maintained too long, the hearth and descending stock may be cooled below the "critical temperature" mentioned by Mr. Johnson, in his paper on the physical action of the blast furnace, and the furnace may go to the other extreme, and become cold. This is especially the case when coal or coke, high in sulphur, is used. Possibly a day or more may be consumed in getting the furnace back to normal conditions.

The great value of an abundant blast capacity in the handling of a furnace was once brought home to me in a striking manner, in the management of a furnace of 250 tons' capacity, working on soft coke and a very fine brown hematite, similar in structure and fineness to the Lake Superior Mesabi ores. It was one of a three-furnace plant; but the gas mains of the

[1] A paper presented at the London (July, 1906) meeting of the American Institute of Mining Engineers.

furnaces were not connected. Consequently, when steam was low on one furnace, no help could be obtained from its neighbors, and the engines of this particular furnace were always run at their full capacity. The soft coke and fine ore gave rise to more or less sticking, which was handled in the usual way. During the campaign, the blast main from the spare engine of one of the other furnaces (95 by 21 feet in size) was connected with this furnace, so that, while the latter depended ordinarily upon its own boilers and engines, the spare engine of the large furnace could at once put on, if the pressure of blast began to rise. Since, however, the loss of blast from unavoidable leakage around a furnace increases rapidly with the pressure, it was not sufficient to add merely enough blast from the spare engine to make up for the loss measured by the revolutions of the regular engines; much more than this theoretically necessary amount was always needed. The normal amount of blast used was about 28,000 cubic feet per minute of from 11 to 12 pounds pressure. The spare engine, a double compound Tod of 30,000 cubic feet capacity, was generally run at about 20 revolutions per minute, thus giving about 15,000 cubic feet extra. As a rule, if the foreman put on the extra engine, as soon as the gauge showed the pressure of the blast to be increasing, 20 minutes sufficed to loosen the stock and get the furnace back to its normal "gait;" but if, as was sometimes the case, the pressure was allowed to go up three or four pounds before it was possible to furnish this relief (the spare engine being at work on its own furnace), then one and sometimes two hours of hard blowing were required. The usual remedies of "jerking" and cutting down the heat of the blast were discontinued; and the only one used afterwards was the very simple procedure of turning on the spare engine for a short time, upon which the pressure gradually fell to the normal, when the extra engine was taken off. Under this treatment, the furnace was not only more quickly loosened up, but, since the rate of driving had not been much reduced, the tonnage suffered but little.

It is true that, under the various conditions of practice, all furnaces do not behave in the same manner, so that adding more blast for a short time may not prove successful in all cases; but situations in which an abundant reserve of blast would be of advantage occur very often, as every furnaceman knows.

A large number of boilers of the best modern water-tube types will not effect this result, because, as soon as the gas supply to a boiler is reduced, the steam must fall from lack of fuel. Firing with coal, of course, helps to a certain extent; but it does not take the place of abundant gas. Forced draft, with hand-firing, although better than hand-firing with natural draft, is not as efficient as plenty of gas. The automatic stoker avoids the cooling due to frequent opening of charging-doors involved in feeding coal by hand; but it is impossible to push the stokers beyond a certain speed, so that, except in the amount of labor required, the machine has no particular advantage over hand-firing with forced draft, for the rapid raising of steam in an emergency. Moreover, it is useless to add boilers to a furnace plant beyond a certain limit, because, unless there is sufficient gas to fill the combustion chambers properly, no advantage is gained. On the contrary, the results are not as good as those attainable with fewer boilers and more gas to each one.

TABLE I.

AVERAGE ANALYSES OF PRODUCER AND FURNACE-GASES.

	A. Producer-Gas. Volume Percentage.	B. Furnace-Gas, Volume Percentage.
Carbon monoxide (CO)	22.0 to 30.0	25.0
Carbon dioxide (CO_2)	6.0 to 1.5	13.5
Hydrogen (H) ..	15.0 to 7.0	1.5
Methane (CH_4) .	3.0 to 1.5	0.0
Nitrogen (N) ...	54.0 to 60.0	60.0
	100.0 100.0	100.0

A, from R. D. Wood & Co.'s pamphlet on Producer-Gases; B, from 50 analyses made under the writer's direction.

It seems necessary, therefore, to adopt some other means for supplying additional blast at need; and I can see no cheaper or more feasible means than the use of a gas-producer driven by forced draft.

With producers, the amount of coal burned in good practice would not vary much from what is now used. Even the light fires kept on the boiler grates to keep the gas lit might be dispensed with, since the flow of gas to the boilers would not be checked, and there would be no danger of the flames going out. The net calorific effect of coal burnt under the boilers and in the gas-producers, respectively, is, if not the same, rather in favor of the producer; indeed, the efficiency of carbon burnt in the form of producer-gas is claimed to be from five to 25 per cent greater than that of direct combustion of solid fuel. It is certain, therefore, that no more coal would be used than in the present way, while the producer would give the added advantage of permitting at all times a perfect control of the amount of gas under the boilers. Moreover, a glance at the average analyses of producer and blast-furnace gases in table 1 shows the greater richness of the former, and the great advantage of having them available, as a portion of the gaseous mixture burned under the boilers.

The arrangements for delivering the producer-gas to the boilers, and the size and form of burners used, would naturally vary according as local conditions demand. Either overhead or underground mains could be used, provided there were proper cleaning facilities. Separate mains for the blast furnace gas and the producer-gas should be employed: (1) in order that the producer-gas main could be cleaned without shutting down the furnace; (2) to prevent the producer-gas from flowing up the down-comer to the top of the furnace, instead of being drawn under the boilers. This would occur only when shutting off the blast, and would be due to insufficient height of the boiler chimney, though this might be otherwise as high as present practice demands. The latter risk could be obviated by means of suitable valves placed between the boilers and the furnace; but such valves would have to be closed at every step, which would be troublesome, and therefore might be sometimes forgotten.

The greater cost of separate mains and separate burners at the boilers might be advanced as an argument for turning the producer-gas into the blast main from the furnace to the boiler plant; but I believe the two objections above noted would, in the long run, more than counterbalance the saving in first cost resulting from using a single system of mains for both gases.

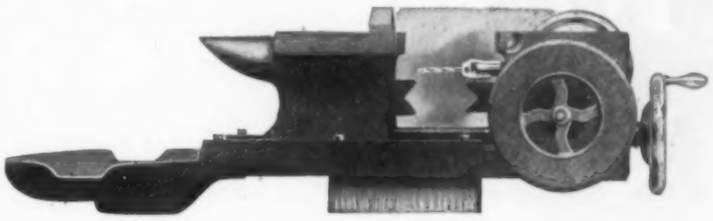
The use of producer-gas in the stoves, as well as under the boilers, is not suggested as one of the advantages to be secured by having a few producers connected with a blast furnace. If desired, the producer-gas could as easily be introduced into the stoves as under the boilers; but its use there would be so infrequent as hardly to warrant the expense of installation. The real advantage of adding producers to a blast-furnace plant would be confined to the boilers, where the gain from having an abundant supply of rich gas, under perfect control, would very soon repay the cost of installation by increased output and greater regularity of product.

To a plant of three or more blast furnaces, gas-producers would not be of as great value as to a single furnace; yet even with three or four connected furnaces, coal must be burned under the boilers; and in this case, also, the gas-producers would have the advantage over the present mode of coal-

firing, that a greater calorific effect is obtained from the fuel. In either case, the labor would be a trifle less, and the firing would be under better control, which would mean less variation in the amount of air blown through the furnace, with all the well-known attendant advantages of such regularity.

THE DETROIT COMBINATION TOOL.

The combination tool illustrated in the accompanying half tone is manufactured by the Detroit Tool Co. It comprises six tools in one, and does not occupy any greater space than any one of the six tools forming the combination. It can be used to advantage in the pattern department of a foundry, and is a good outfit for construction gangs on railroads, bridges and other outside erecting.



DETROIT COMBINATION TOOL.

In detail, the tool consists of an iron base, having at one end a stationary head stock, and at the other movable anvil and overhanging forge hearth. The head stock contains the mechanism of a rotary blower, drill and emery wheel, and forms the stationary part of a vise and pipe vise jaw. The anvil serves as the movable part of the vise and pipe vise jaw and moves back and forward on the bed piece between adjustable guides, being operated by means of a screw and hand wheel at the outer end of the head stock. The air delivered by the blower in the head stock is conveyed through a cored channel in the bed piece to the forge hearth at the opposite end.

The forge hearth is attached to the bed piece, by means of interlocking lugs, and can be removed and replaced at the expense of but slight time and trouble. This is a feature of considerable value, as the forge hearth can be removed and set aside when not in use, thus taking up considerably less space.

The fan shaft of the blower projects through the air intake at the side of the gear case, and is arranged to receive an emery wheel. The latter is constructed with an open center, in such a way as to blow air into the intake pipe and in so doing, it draws the emery dust away from the operator and into the forge. The blower and emery wheel are operated by a hand crank on the rear side of the gear case. The crank is fitted with a pulley for the application of power when so desired.

The fan and emery wheel are geared 12 to 1, and may be run by hand as high as 2,000 revolutions per minute. The drill is operated by the same driving wheel, and is fitted with a clutch arrangement, so that it may be thrown in and out of gear at the will of the operator. Either the drill or blower may be operated independently of one another. The accessories furnished with the tool include drill, a blacksmith's hardy, blacksmith's tongs and a crucible holder for holding a crucible or metal ladle over the fire. The tool is made in three sizes:

WESTINGHOUSE ELECTRIC STOCKHOLDERS MEET.

Stockholders of the Westinghouse Electric & Mfg. Co. met at the company's works in East Pittsburg, July 25, elected directors and transacted other business. The number of directors was increased to twelve and James Hazen Hyde was dropped. Those elected were: Anthony N. Brady, N. W. Bumstead, George W. Hebard, E. M. Herr, Brayton Ives, Ph. Ferd Kobbe, George C. Smith, Frank H. Taylor, H. H. Westinghouse, T. W. Siemon, W. D. Uptegraff and George Westinghouse.

In the absence of the president, the meeting was presided over by Vice President Herr, who made a report dealing mainly with recent extensive additions to the company's plants. March 31, last there were 4,705 employes, exclusive of the sales department of 429. Second Vice President Osborne presented a report showing the sales of the company for the fiscal years ending as follows:

March 31, 1901	$12,516,071.86
March 31, 1902	17,927,339.43
March 31, 1903	19,571,294.91
March 31, 1904	18,569,614.21
March 31, 1905	16,570,717.13
March 31, 1906	24,939,602.35

The report of George Westinghouse, president, was cabled from Paris as follows: "Keen competition with manufacturers in Europe and the usual difficulty in starting new plants have thus far prevented returns upon the money invested in these foreign enterprises, but it may be stated with confidence that the business of each of these interests will, in the near future, be brought to a condition which will make these investments profitable.

"The recent securing of important contracts, aggregating $6,000,000, from the municipal authorities of St. Petersburg, Russia, for the construction of electric tramways in that city, resulted in negotiations between important French bankers, who controlled a suitable modern electric manufacturing plant in Moscow. These negotiations have resulted in the formation of the Societe Westinghouse Electrique de Russie, organized under French laws, to purchase these works and the electric business which has been developed by the electric department of the Societe Anonyme Westinghouse of St. Petersburg (The Russian Brake Co.) on a most favorable basis, and which will cover all expenditures in developing the electric department besides increasing your assets by nearly $1,000,000.

"There are further important pending operations which may soon result as favorably for your company as has the business in Russia."

The statement of income and profit and loss covered a period of six years ending with March 31, 1906:

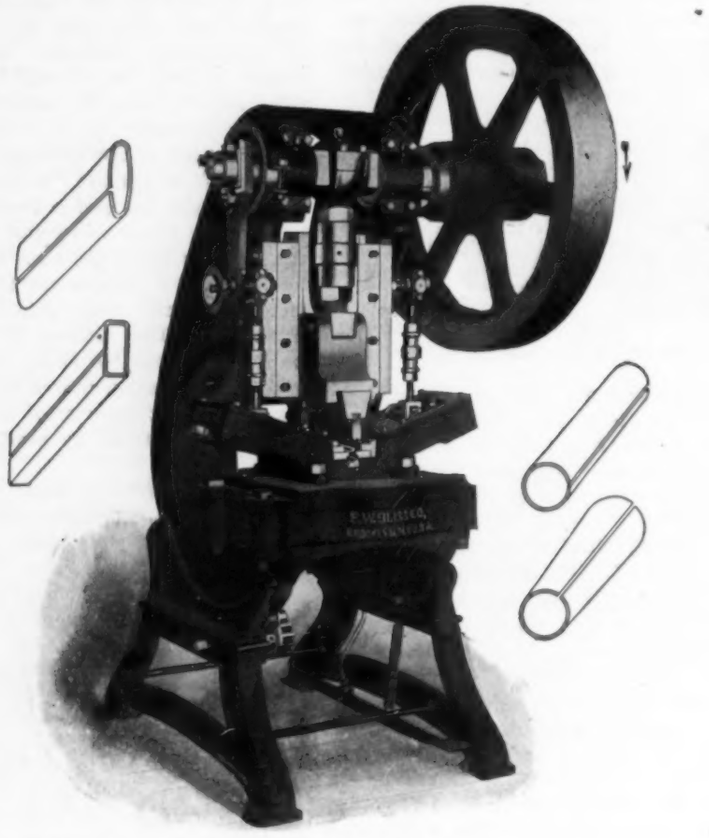
Gross earnings		$114,618,537.35
Cost of shipments		97,726,008.55
Net earnings		$ 16,892,528.80
Other income		3,664,590.47
Total income		$ 20,557,119.27
Interest on bonds and debentures	$ 911,662.28	
Interest and discount	2,955,104.59	
Tax, commissions, premiums, etc.	728,257.03	
Accounts written off	187,469.59	
Property depreciated	1,676,635.83	
Stocks depreciated	620,523.77	
		7,079,653.09
Net income—surplus		$ 13,477,466.18
Surplus, March 31, 1900	$3,570,015.58	
Premium on stock	4,415,229.81	
		7,985,245.39
Gross surplus		$ 21,462,711.57
Dividends		9,922,069.49
Surplus, March 31, 1906		$ 11,540,642.08

San Francisco Scrap.—The shipment of iron and steel scrap from the ruins of San Francisco has already assumed considerable proportions. In the haste to clear up the debris, scrap is being sold at exceedingly low prices, but the freight charges to Chicago and other eastern points of destination are so high as to bring its delivered price to the level of eastern quotations.

Explorations of the Geological Survey indicate that Alaska will eventually become a large producer of tin.

BLISS TUBE FORMING PRESS.

In power press work there has been in recent years a constant demand for combining the operations for doing in one handling what heretofore has required several. The various operations which have been combined are too numerous to mention, but in the accompanying illustration we present a press specially designed for doing two operations and which is used in the manufacture of tubes similar to those shown in the small outlines.



BLISS TUBE FORMING PRESS.

This press is fitted with lateral slides and a movable mandrel attached to a slide resting on a strong compression spring heavy enough to do the forming. It will form tubes up to 10 inches long at one blow either straight or tapered, round, oval or square, one-fourth inch to one inch in diameter, according to the dies used in it. The toggle slides which operate from the right and left are cam actuated and are easily adusted for different shapes. The mandrel over which the tubes are formed, first descends upon the blank bending it into U shape and carrying it against the lower die. After the lateral slides act, the press slide continues its stroke and the punch completes the work.

The principles adopted are such that they may be adapted to much larger presses for forming tubes of considerable length. The press as shown weighs complete about 3,600 pounds. It has been built by the E. W. Bliss Co., 8 Adams street, Brooklyn, New York.

GATES ON THE OUTLOOK.

"The iron and steel industry," says John W. Gates, "is stronger today than it has been in two years. Consumption is increasing rapidly and Bessemer iron is a scarce article. Foundry iron conditions are also strong. It stands to reason a large number of furnaces that have been operating at high tension for the past year or two will have to blow out, and it is highly probable that this, in the face of such a pronounced demand, will tend to create a large shortage of pig iron. Business on the books of the various steel companies represents many months' activities for the mills. The tendency of steel and iron prices is upwards, and we can look far enough ahead to forecast that there will be no decline in steel prices for eight months or a year at least."

The Algoma steel rail mill of the Lake Superior Corporation set a new record of 162,000 tons for the fiscal year ending June 30. The average price secured for the rails was $33 per ton.

POSSIBILITIES OF BEACH SAND.

In an interview with Frank G. Carpenter, Dr. David T. Day of the United States Geological Survey, discussing the black sands of the west, said:

"The gold and platinum are by no means the only values in the black sand," continued Dr. Day. "There are also metals of industrial worth containing enormous possibilities. A great part of the sand is made up of magnetic iron, which by a little electric furnace made last year, we are able to turn into excellent steel. All along the Pacific coast, from Puget Sound to the southern end of California, the black sand exists in great quantities. It lies in deposits back from the coast, on ledges and headlands, and is washed up by the sea at every high tide, being rolled over and over and thrown out upon the beach. In that sand, if it were separated from the other minerals, there is enough iron to fill Lake Superior and make it solid iron ore.

"This is on the estimate of working sands that contain only 10 per cent of magnetic iron, and some contain far more. Suppose we had five hundred furnaces situated along that coast, and that each should handle but one hundred tons of ore a day. Altogether they would handle fifty thousand tons per day, and at three hundred days to the year have an annual output of fifteen million tons, or about one-third as much as the iron product of the whole United States. That would make the Pacific slope one of the great industrial centers of our country, and also the workshop of China, Japan and the remainder of the orient. Indeed the steel tracks for China's new railroads may yet come from the black sands of the Pacific."

STEEL CARS ON HARRIMAN LINES.

Commenting on the coming introduction of all-steel cars on the Harriman lines, Vice President Calvin of the Southern Pacific says: "The matter has passed the experimental stage. Tests by the company have demonstrated that such cars can be made as easily, and, considering the benefits afforded, as cheaply as wooden cars. The first car will be completed in about 60 days, and at once put into use. Others will be installed as fast as they can be built. Electricity generated from the car axle and stored in the baggage car is to be substituted for gas for heating or lighting purposes. This and the introduction of metal equipment we expect will minimize both the liability of wrecks and their results. All steel construction, it is assumed, will prevent telescoping and electricity eliminate the danger of fire. We did not decide on the change until exhaustive tests had been made with two steel cars built for us in the east.

REDUCTION

MADE IN BRITISH MARKED IRON PRICES

On the Eve of Quarterly Meeting Kept Intending Buyers Away.—Meeting American Competition.

(Special Correspondence.)

Birmingham, Eng., July 21.—Last week's quarterly meeting was a very disappointing event, as far as actual business was concerned. The reason commonly given was the announcement made on Thursday morning by the various marked-bar firms of a reduction in marked iron. Since January last, the recognized figure has been £9, which is now reduced to £8 10s. Other ironmasters express great irritation that the reductions should have been made on the eve of the quarterly meeting; but the marked bar people retort with some force that common iron has been steadily reducing for months past, until it is now about £6, or £3 below the price of marked iron, an altogether impossible disparity. For years past, the recognized difference has been about 30s. The effect of the reduction was to keep a number of intending buyers away, while others who brought orders in their pockets did their best to "bear" the market, and being generally unsuccessful took their orders away again. It is thought that the check will only be temporary.

As buying lately has been entirely for daily requirements, bigger orders must shortly be placed. The position of the unmarked bar maker is an awkward one. As prices are now only 7s 6d above what they were before the boom began, and all this is absorbed by dearer pig iron. The higher wages have to come out of the unlucky ironmaster's pocket. The Gas Strip Association held a meeting, but decided not to alter the present figures.

Orders for steel are plentiful, and galvanized sheets are being sent out in great quantities at £12 15s or 5s above the standard. Pig iron is rather weak, Northampton now selling at £2 7s. Derbyshire is about £2 8s to £2 10s. Foundries, engineering establishments, and wire drawers are all as busy as they can be. The firms announcing the reductions are: The Round Oak Iron & Steel Works, Brierley Hill; N. Hingley & Sons, Netherton Iron Works; William Barrows & Sons (per B. Bunch & Sons), Bloomfield Iron Works, Tipton; John Bagnall & Sons, Lea Brooks Iron Works, J. Bradley & Sons, Stourbridge Iron Works.

Doings of Ironmasters.

One of our best known ironmasters, Mr. Ebenezer Cooper, of the firm of Roberts & Cooper, who have several Black Country establishments, is retiring from active work. Mr. Cooper has had a remarkable career. Commencing as a ball furnaceman with hardly a penny in his pocket, he accumulated a handsome fortune, and, having some very able sons, he is inclined to enjoy his comfortable income from investments, of £3,000 a year. As a popular captain of industry, he carries with him into his retirement the good wishes of everyone in the trade.

The lord mayor elect of Birmingham, Councillor Henry James Sayer, is a familiar figure on 'change, being at the head of a very prosperous tinplate merchant's business. For some years he has been an active worker on the board of guardians, as a magistrate, and as a member of the city council. He combines very happily, geniality of manner with strength and initiative.

Another of our local ironmasters, Mr. Ebenezer Parkes, M. P., for Central Birmingham, has been a prominent figure at the Sixth Congress of the Chambers of Commerce of the Empire, making himself responsible for the expression of Birmingham feeling on the proposal to reduce Canadian rates of postage for British trade literature. He thinks it hard both on Canada and the mother country that the Dominion should be flooded with American literature, instead of circulars and catalogs from this country. Mr. Parkes has obtained a promise from the postmaster general to look into the matter, and if possible, obtain the reduction.

American Competition Fought.

One of our biggest firms, Messrs. W. & T. Avery, Ltd., has nearly completed a new factory at Milwaukee, which is to be run by the Avery Scale Co. of America, with a nominal capital of £25,000. The explanation given by the chairman, Mr. Walter Chamberlain, at the annual meeting on Thursday, was that a company had been formed in America for the manufacture of automatic weighing machines, and the new company was formed both to meet that competition in America, and also to place the British firm on even terms with "Americans who would sell machinery in this country at cost price, and less than cost price, and thus produce unfair competition." This factory is to be at work in about seven weeks. Mr. W. E. Hipkins, the managing director, justifying this policy, read a remarkable letter from some friends in the states, which he said finally decided the directors. The letter read as follows: "The quickest way and shortest cut for your people to place your goods in this market is to establish a branch factory here, and thus escape the duty. Life is too short to waste it in trying to educate a lot of people who do not care to be educated in regard to the protective tariff system. Bring your works over here, and you will have so much business that it will be necessary for you to operate the plant day and night."

Mr. Hipkins said their representative found things so brisk in America that it was impossible to rent a suitable factory, so they proceeded to build . He went on to explain that owing to the lack of capable managers, they were unable to carry out other projects, and the directors had given a second donation of £500 to the Birmingham University with a view to encourage their training.

Ship Canal to Birmingham.

In several ways the question of a ship canal to the coast from Birmingham has been revived lately, a very important event being the holding of a conference of local authorities in the Midland district at the Birmingham council house, under the presidency of the lord mayor. Various projects were discussed. It was shown to be comparatively easy to get to Bristol by linking up the central canals with the Severn, but Birmingham ironmasters want to get to London and Liverpool. A resolution was carried affirming the necessity of through water communication, the suggested waterways to be controlled by the government, or by a public trust on which the government would have a preponderating vote, the capital expenditure also to be guaranteed by the government. Mr. Parkes, M. P., pointed out that for want of canal communication one heavy trade after another was continually migrating to the seaboard.

The most important evidence given before the Royal Commission on Canals and Waterways now sitting, has emanated from ironmasters and managers.

Booming West Virginia.—The second annual convention of the West Virginia Board of Trade will be held at Charleston, Oct. 9. Arrangements are being completed by the Charleston Chamber of Commerce, and Governor Dawson, Henry G. Davis, J. M. Camden, Senator Elkins and others interested in the development of the state are expected to attend. The organization comprises 22 constituent bodies representing every section of material interest of the commonwealth. R. B. Naylor, of Wheeling, is secretary.

A SIMPLE ROTARY DISTRIBUTOR FOR BLAST-FURNACE CHARGES.[1]

BY DAVID BAKER.

In a paper presented to the American Institute of Mining Engineers, September, 1904, entitled "Improvements in the Mechanical Charging of the Modern Blast Furnace," I showed the great fault of mechanical charging devices to be that the materials charged by the dumping of the skip were separated, the coarse materials having high velocity, and the fine, low —thus giving paths of low resistance through the stock in the furnace, which resulted in unequal distribution of the furnace gases, unequal reduction, slips, scaffolds, irregular cutting of the inwall, "off" iron, and increased fuel consumption. I showed how this could be prevented by rotary distribution, through which the irregular distribution in one layer charged is compensated by charging the subsequent layers from successively varied positions of the charger, and becomes practically eliminated when the angle between two successive positions is a little more or less than an even fraction of a full circle. Of all the devices then on the market, the nearest approach to the ideal arrangement was found in the Brown distributor, a full description of which was given. The one defect pointed out, however, was the difficulty of maintaining so much mechanism on the top of a blast furnace.

Since the presentation of that paper, I have designed a very simple form of rotary distributor, which may be applied to any form of double-bell charger, retaining the perfect gas seal, which is so admirably obtained by that construction.

In seeking protection for this invention, I found no similar distributor on record in the patent offices of the various countries where application was made; but an application showing the same construction was filed in the United States shortly afterwards by Mr. Albrecht B. Neumann, of Chicago, Ill. A joint ownership of the invention was the result; and the apparatus has received the name of the Baker and Neumann distributor.

Fig. 1 shows the top of a modern skip-filled furnace, provided with a main bell, closing the mouth of the furnace, and a gas-seal bell above, closing the gas seal. It will be noticed that this small bell, which in ordinary construction permits a discharge of the materials all around its periphery, is here provided with a deflector plate that causes the material to discharge only around one-half of its circumference, when the bell is lowered. The dotted lines show the position of the distributing bell and plate when the load is discharged.

Rotation is given to the bell and plate during its upward movement to close, by the ratchet lever (A) which drives the bevel gear (B) through which the hollow rod (C) passes, but to which it is rotatably connected by two wings or feathers, projecting from opposite sides of the hollow bell hanger and traveling in corresponding grooves in the hub of the bevel gear (B).

Fig. 2 is an enlarged view of the upper end of the hollow distributing-bell hanger, the crosshead connection to the bell-operating beam and the bevel-gear driver, showing also the ratchet-lever (A) and its method of attachment to the bell-operating lever with the connection of the indicator-rod leading to the ground.

By drilling holes where required, the ratchet-lever may be provided with several points of attachment to the bell-beam, and the revolution of the distributor set at any angle desired. The ratchet permits the lowering of the distributing-bell without imparting any turning movement to the plate and bell; but during the closing of this bell, when it is without any load, the rotation is made.

This construction can, therefore, be made strong and simple, with few parts, requiring very little attention, and practically as simple and durable as the bell-beams. The preferred method of operation is to send the fuel of the charge to the top in four

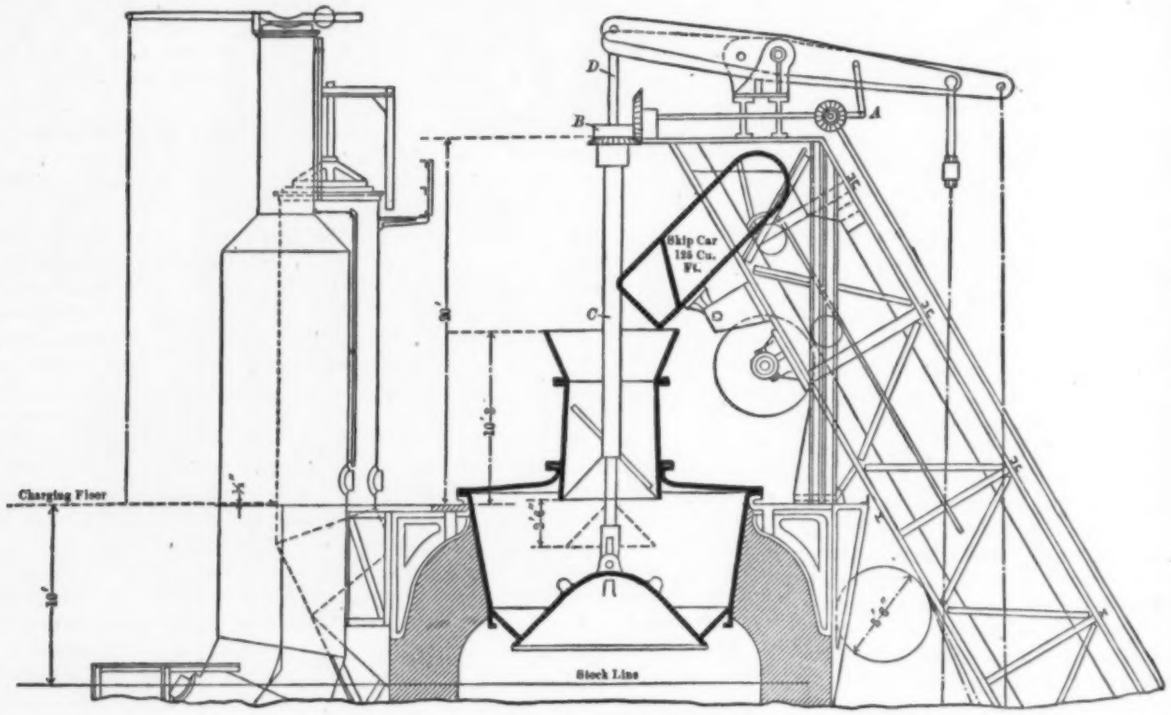


FIG. 1.—TOP OF A MODERN SKIP-FILLED FURNACE.

[1]A paper presented at the London (July, 1906) meeting of the American Institute of Mining Engineers.

skips and the ore and limestone in the following four skips; but in some localities it has been found advantageous to hoist the flux and coke together.

When the whole charge is thus hoisted in light skips, the distributing bell is set to rotate 91 degrees at each discharge which causes the center points of each discharge of the distributing-bell to rotate eight degrees for each charge from the position of the preceding charge. The overlapping corrects the sorting which may have been made in any one charge.

It is possible, when desired, to arrange the throw of the distributor a little more than 120 degrees or 180 degrees, depending on how the furnace

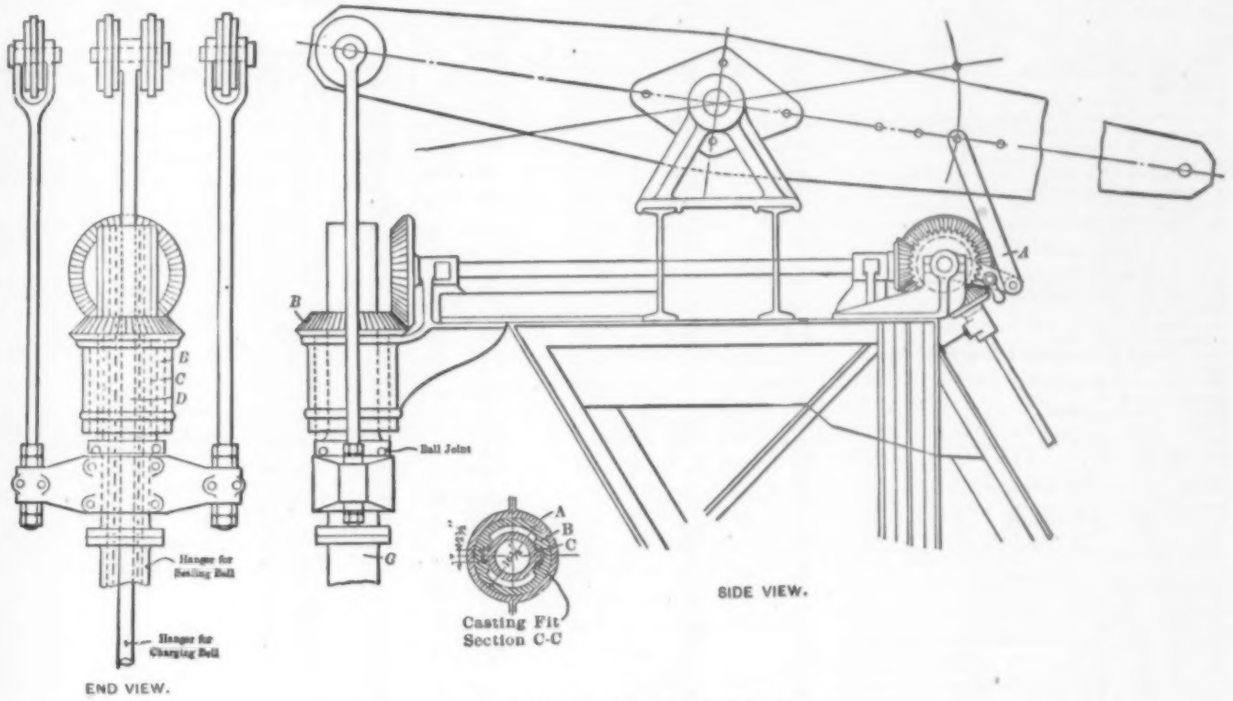


FIG. 2.—ENLARGED VIEW OF RATCHET LEVER.

charge is to be hoisted, but I prefer to hoist the charge in eight skips and give a 91 degree movement to the distributor.

At the present writing, seven furnaces have been equipped with this device, the first one having been installed a little over a year ago. As was expected, the mechanical part of the arrangement has given no trouble whatever. A door is provided, however, in the receiving-hopper, through which, by means of a steel bar and sledge, the plate may be cut loose in a few minutes, and dropped into the furnace. Fortunately, this safeguard has never been needed.

The results of the operation of this method of distribution have been very gratifying. The work of the three furnaces in which the device was first installed, compared with their previous record, shows an average saving of fuel of 5.4 per cent, an increase in production of 21.6 per cent, a large reduction in the flue-dust thrown off, and a great increase in regularity of running.

BIG CASTING POURED BY ALLIS-CHALMERS CO.

Over 178 tons of iron was recently poured in one day at the West Allis foundries of the Allis-Chalmers Co. This quantity, which included a single casting requiring 118 tons, is the heaviest pour run for several months. The big casting is a duplicate of the enormous slide and bed plate now being finished for the Carnegie Steel Co., Sharon, Pa., as a part of a 4,000 horsepower rolling mill engine. The mold for this second casting was made an exact reproduction of the first, poured some months ago. It occupied a pit in the floor of the molding shop which measured 40 feet long, 15 feet wide and 11 feet deep. The pouring operation alone on this casting consumed nine minutes. Four ladles of 25 tons-capacity each, one of 13 tons and four of 5 ton capacity, were used in the operation.

The day mentioned was a big one for all three foundries of the Allis-Chalmers Co. at Reliance, South Foundry and West Allis works. An aggregate of over 244 tons of metal was poured. These three plants, in spite of the present molders' strike, are averaging every day fully 57 per cent of their regular output. Less than a month ago a 75-ton fly wheel for the Illinois Steel Co. was cast at the Reliance foundry, aggregating 151,000 pounds in the rough.

A large number of molding machines, which have been in successful operation at the South foundry for some time past, are proving a great advantage over the old method, as there is an increase of 50 to 75 per cent in the output and the cost of production is about the same as heretofore.

The foreign commerce of the United States during the fiscal year just ended aggregated $2,970,000,000, thus falling but little short of the three billion dollar mark. This mark is passed if the trade with Porto Rico and Hawaii is included. Imports were valued at $1,226,615,379 and exports at $1,743,763,612, setting new records in both outgoing and incoming trade.

On the ground that their violation of the law in granting rebates in coal shipments was technical and not willful, and therefore called for only a moderate penalty, Chief Justice Mills, in the United States court at Los Vegas, N. M., has imposed a fine of $3,000 on each count of the indictments against the Atchison, Topeka & Santa Fe Railway Co., and the Colorado Fuel & Iron Co.

Market Manifests Increased Strength

Improved strength was manifested during the past week by almost the entire line of securities. The markets gave evidence of an awakening from their recent indifference to prosperity reports in all directions of activity and closing prices of the week were well above those of the opening. Naturally iron, steel and manufacturing securities, which had suffered most severely from the markets' refusal to give due consideration to repeated evidences of which bidding closed during the week, the average offer was less than 101, against above 108 offered for a similar issue in February. For a part of the issue no bids were received. The favorable conditions anticipated in the forthcoming quarterly report of the steel corporation, although pretty thoroughly discounted, aided in the upward movement in these issues, which regained much of their recent loss. Colorado Fuel & Iron and Tennessee

FINANCIAL NOTES.

Directors of the American Ship Building Co. at their meeting in Cleveland last week declared the regular quarterly dividend of 1¾ per cent on the preferred stock and a regular quarterly dividend of one per cent on the common, with an extra dividend of two per cent on the latter, all payable Sept. 1. Recent earnings of the company have been extremely heavy and their continuance is assured by the

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quotation July 21	Closing Quo. July 28	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend Basis	Dividend Being Paid	Dividend Date Last Div. Dec.
Allis-Chalmers Co	16¼	18	+1⅝	Sept.	100	19,820,000			
Allis-Chalmers preferred	46¾	49¼	+2½		100	16,150,000	7 cum		Feb., 1904
American Can	6¾	7	+ ¾	Apr. 24	100	41,233,300			
American Can preferred	52	54½	+2½		100	41,233,300	7 cum	5 Q.	July, 1906
American Car and Foundry	35½	37¾	+2¼	June 28	100	30,000,000			May, 1905
AmericanCar and Foundry preferred	99¾	100½	+ ¾		100	30,000,000	7 n. c.	7 Q.	July, 1906
American Locomotive	69¾	72⅛	+2⅜	Oct. 16	100	25,000,000		1¾	July, 1906
American Locomotive preferred	114½	114	— ½		100	24,100,000	7 cum	7 Q.	July, 1906
American Shipbuilding	65½	65½	+ ⅛	Oct. 2	100	7,600,000	4	6 Q.	Sept., 1906
American Shipbuilding preferred	105½	106¼	+ ¾		100	7,900,000	7 n. c.	7 Q.	Sept., 1906
American Steel Foundries	10¼	11⅝	+1⅜	Oct. 3	100	17,700,000			
American Steel Foundries preferred	42¼	44	+1⅝		100	17,700,000	6 cum		Aug., 1905
Barney & Smith	65	65	.....	June 5	100	1,000,000			June, 1894
Barney & Smith preferred	135	135	.....		100	2,500,000	8 cum	8 Q.	June 1906
Bethlehem Steel	22	22	.....	April 3	100	15,000,000			
Bethlehem Steel preferred	86	86	.....		100	15,000,000	7 n. c.	7 Q.	Aug., 1906
Bullock Electric preferred	111	111	.....	Oct. 2	100	1,000,000	6	6 Q.	July, 1906
Cambria Steel	34¼	34⅞	+ ⅜	March 20	50	45,000,000	6	3 Q.	Aug., 1906
Cambria Iron	49½	49½	.....		50	8,468,000	4	4 S. A.	Apr., 1906
Colorado Fuel & Iron	49⅜	54⅛	+4⅝	Oct. 15	100	30,132,000	7		Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	18	18	.....	May 31	100	6,098,000	5		Nov., 1902
Crucible Steel	11¼	12	+ ¾	Oct. 17	100	25,000,000			
Crucible Steel preferred	75⅝	78	+2⅜		100	25,000,000	7 cum		June, 1906
Empire Steel	7	7	.....	Feb. 28	100	2,281,400			
Empire Steel preferred	38	38	.....		100	2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	93½	93½	.....	Feb. 20	100	1,000,000	6	6 Q.	May, 1906
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	May, 1906
General Electric	163	167¾	+4¾	May 8	100	48,256,050	8	8 Q.	July, 1906
International Pump	42	47	+5	June 5	100	12,262,500		2	July, 1905
International Pump preferred	82	86	+4		100	8,850,000	6 cum	6 Q.	Aug., 1906
Lackawanna Steel	65	65	.....	March 14	100	34,971,400			
Lake Superior Corporation	17	17	.....	Oct. 3	100	40,000,000			
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	May, 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	June, 1906
Otis Elevator Co	48	46	—2	March 19	100	6,350,300		2 A.	Apr., 1906
Otis Elevator Co. preferred	98	96	—2		100	5,589,500	6 n. c.	6 Q.	July, 1906
Pittsburg Coal Co	13½	13¼	— ¼	Feb. 12	100	30,135,000			
Pittsburg Coal preferred	52	53¾	+1¾		100	30,716,200	7		Apr., 1905
Pressed Steel Car	47⅝	49⅞	+2¼	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	97	99	+2		100	12,500,000	7 n. c.	7 Q.	Aug., 1906
Pullman Palace Car	221	224	+3	Oct. 18	100	74,000,000		8 Q.	Aug., 1906
Railway Steel Spring	49¾	52⅞	+3⅛	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	99	99¾	— ¼		100	13,500,000	7 cum	7 Q.	June, 1906
Republic Iron & Steel	26	29	+3	Oct. 17	100	27,352,000			
Republic Iron & Steel preferred	95⅛	99¼	+3⅛		100	20,852,000	7 cum	7 Q.	Apr., 1906
Sloss-Sheffield	72	75⅝	+3⅝	March 14	100	7,500,000	5	5	Jan., 1906
Sloss-Sheffield preferred	105	106	+1		100	6,700,000	7 n. c.	7 Q.	July, 1906
Tennessee Coal & Iron	150¾	154¾	+4	May 15	100	22,552,800		4 Q.	Aug., 1906
U. S. Cast Iron Pipe & Foundry	46¾	49⅛	+2⅜	June 27	100	12,500,000		2	Sept., 1906
U. S. Cast Iron Pipe & Foundry preferred	89	93	+4		100	12,500,000	7 n. c.	7	Sept., 1906
U. S. Steel	36	39⅛	+3⅛	April 16	100	508,302,500			Dec., 1903
U. S. Steel preferred	102⅞	106⅝	+3¾		100	360,281,100	7 cum	7 Q.	May, 1906
U. S. Steel 5's	97⅝	98⅜	+ ¾		100	463,798,000	5	5 A.	
Virginia Iron, Coal & Coke	40¼	40⅞	+ ¾	Sept. 18	100	8,641,600			
Westinghouse Electric	151	152	+1	June 27	50	20,996,350	10	10 Q.	July, 1906
Westinghouse Air Brake	146	145½	— ½	Oct. 2	50	10,990,450	20	20 Q.	July, 1906

record business at profitable prices, were leaders in the advance and netted handsome gains throughout the list. The money situation was easy in spite of the cutting off of gold importations by reason of acute disorders in Russia, and low rates for call loans proved attractive for stock market operations. On the other hand, investment conditions were heavy and bond sales were not large. For $12,500,000 worth of New York four per cent bonds, on Coal & Iron netted large advances. Westinghouse electric quotations were unaffected by developments of the stockholders' meeting held during the week. On the Pittsburg exchange Crucible Steel issues were active and strong, making substantial gains. The old contracts on which it was impossible to accumulate much profit, it is stated, are now well cleared out and new orders are at figures which mean more in the earnings of the company. large number of vessels booked for construction during the winter. No publication of details of the company's affairs will be made until the annual stockholders' meeting in October.

The annual report of the Lake Superior Corporation will not be prepared and approved until shortly before the stockholders' meeting in October. It is stated, however, that gross earnings are well over $1,000,000, and that net earnings are also large.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

The New Paddock-Hawley Co. has been incorporated under Nebraska laws for $700,000 by D. A. Baum, J. E. Baum and Fred Hawley. This action followed the purchase by the Baums of the Paddock-Hawley Co. of St. Louis, Mo. The allied iron jobbing interests include the Baum Iron Co. of Omaha, the Paddock-Hawley Co. of St. Louis and the Sioux City Iron Co. of Sioux City. The Baums are also largely interested in the Des Moines Iron Co. of Des Moines.

The Hecket Bros. Mfg. Co., Woodstock, Ill., have been granted a corporation license with a capitalization of $25,000. It will operate a brass foundry at Woodstock and will later add an iron foundry.

Application for a charter for a company to be known as the Hope Lock Co. has been made by John Hope Jr., and others of Cranston, near Providence, R. I. A plant will be located in the Providence district for the manufacture of locks, tools and other hardware. The capitalization will be $200,000.

The Bath Grinder Co., Fitchburg, Mass., has been chartered by John Bath, of that city and others. Grinders and all kinds of machinery will be dealt in, the company having a capitalization of $40,000.

The Farrell Foundry & Machine Co., Ansonia, Conn., has increased its capitalization from $1,150,000 to $1,200,000.

The Schwartz Foundry Co., New Orleans, La., has been incorporated for $300,000 by Moses Schwartz and others.

The Truxal-Painter Mfg. Co., has been organized with a capital of $30,000 to take over, enlarge and operate the plant of Truxal & Painter, and will engage in the manufacture of all kinds of machinery, making a specialty of a hoisting engine recently patented by Carl T. Painter. The incorporators are: B. Truxal, Carl T. Painter, L. M. Coleman, W. S. Beck and B. W. Beck, all of Chattanooga, Tenn.

The Carter Iron Co., Paden City, W. Va., has been organized with a capitalization of $300,000 to take over the plant of the Ohio Valley Foundry & Iron Co. George T. Lewis is promoting the interests of the new company.

The Marion Mfg. Co. of Marion, Ohio, has added $200,000 to its capital stock and will manufacture and sell a new thrasher invented and patented by C. J. Gotshall.

The Central Iron & Coal Co., Lebanon, Pa., has been organized to deal in scrap. The officers are: Felix Pflaum, president and general manager, and M. L. Tyroller, secretary and treasurer.

The Seneca Chain Co., Kent, O., has increased its capital stock from $100,000 to $200,000.

The Ohio & Pennsylvania Steel Co., Cleveland, has been incorporated with a capitalization of $10,000 by L. E. Baker, A. V. Zika, L. M. Rice, F. L. Jameson and J. B. Turner.

The Niles Iron & Sheet Co. has increased its capital stock from $200,000 to $300,000.

The Wheeling Nail Co., Wheeling, W. Va., has been organized with a capitalization of $20,000 to take over the local business of the United Shoe Machine Co. The incorporators are: Edward Keating, N. W. Philbrook, Geo. R. Philbrook, John Coats and W. J. Hanna.

The Omaha Wire & Iron Works, Lincoln, Neb., has been organized with a capitalization of $10,000 to do a wholesale and retail business in manufacturing and selling metal fixtures. The incorporators are Elbert A. Hoisington and Henry M. Martin.

Application has been made for a charter for the Midland Limestone Co., Pittsburg, by W. C. Fownes Jr., J. Ramsey Spear, Charles McKnight and others connected with the Midland Steel Co. The company will develop valuable limestone property which it has recently secured.

The Lawrence Cement Co., Sharon, Pa., has been organized with a capitalization of $1,500,000 by Edwin N. Ohl, Edwin F. Norris and others, of New Castle, Pa., and will erect a cement plant in Lawrence county. It is expected that 1,800 men will be employed.

The Hydraulic Press Brick Co., of St. Louis, has been organized to take over fourteen merging companies. The capital stock of the new company is $10,000,000.

The Cary Automatic Coupler Co., Chicago, Ill., has been organized with a capitalization of $13,000, by B. R. Kozlowski, president and general manager; Lewis C. Cary, first vice president; Edward D. Piper, second vice president; B. Zaleski, treasurer, and J. P. Zaleski, secretary. The new company will manufacture automatic car and train pipe couplers.

The Eureka Automatic Electric & Signal Co. has been formed at Tamaqua, Pa., to manufacture signals. It has a capital of $30,000.

The Long Electric Light, Heat & Power Co., of Mill Hall, Pa., has been chartered. The officers are B. F. Long and J. S. Knisely, Salona, and George Haagen, Mill Hall.

A Pennsylvania charter has been issued to the Continental Furnace Co., which will have an office in Philadelphia. The incorporators are Edgar A. Custon, John Stevenson, III., and Charles M. List, Philadelphia.

The Lovekin Pipe Expanding & Flanging Machine Co., of Pittsburg, has increased its capital from $10,000 to $400,000.

New Construction:—

The Albion Malleable Iron Co., Albion, Mich., has begun the erection of additions which will increase its present output to about 18,000 tons of finished castings annually. Six furnaces will be operated and 300 molders employed. It is expected to have the additions completed by Dec. 1.

The Toledo Steel Casting Co. is the name by which the concern now being launched by Charles A. Parsons, of Toledo, O., and associates will be known. The Schlieper Engineering Co., Pittsburg, is designing the plant, which will include a main building 110 x 420 feet of steel construction, a machine shop, pattern shop, storage house and power plant. Two 20-ton basic open-hearth furnaces will be installed and the plant will be commanded by electric cranes.

The Ohio Foundry Co., Cleveland, O., is erecting a new foundry building 160 x 250 feet. with a finishing department 60 x 300 feet.

The Shenango Furnace Co., Pittsburg, Pa., will build a new blast furnace at Sharpsville, Pa. Contracts have not as yet been placed, but bids on the engines, buildings and other equipment will be asked for in a short time.

The Wallingford Mfg. Co., Wallingford, Vt., is to add a new forge room to its plant.

The Leonard Stove Co., Bowling Green, O., which recently lost its plant by fire, is rebuilding.

The Hocking Valley Fire Clay Co., Nelsonville, O., is to erect a new plant for the manufacture of glazed building brick. The company is capitalized at $75,000.

The J. M. Clark Co. will soon begin

work on a large clay plant near Carbon Hill, three miles from Nelsonville, O. A specialty will be made of the manufacture of furnace linings.

Additions now being made to the Marion, Ind., plant of the Standard Chain Co., will be completed by Aug. 15.

The Fanner Mfg. Co., hardware specialties, Cleveland, O., has prepared plans for two buildings 70 x 320 feet, and 135 x 400 feet, which will be used for foundry and factory purposes.

George Greer, of the American Sheet & Tinplate Co., and a number of associates are reported as planning the erection of a can factory at Newcastle, Pa.

The Elmore Mfg. Co., Southington, Conn., has bought out a machine manufacturing plant at 'Chautauqua, N. Y. President Mathias Moler states that the Elmore company will soon be forced to erect a new and more commodious home.

The Nott Fire Engine Co., Minneapolis, Minn., is adding a brass foundry and making other improvements to its plant.

The Crown Iron Works, Minneapolis, Minn., is building an addition to its structural shop, partly to secure increased working space and partly to provide room for a number of new machine tools.

The Carter & Hawkes Machine Co., Winsted, Conn., has completed plans for a three-story factory building.

The plant of the Adams Machine Works, Corinth, Miss., recently destroyed by fire, will be rebuilt. Considerable new equipment will be required, including planer, lathes, drill presses, shapers, bolt and pipe machines.

Peck, Stowe & Wilcox, Southington, Mass., are considering the building of an addition to their plant. A bolt department will probably be installed before the end of the year.

The Co-Operative Seamless Wire Co., Pawtucket, R. I., is to increase its plant by the erection of a two-story shop 50 x 75 feet, and an office building. About $5,000 worth of new machinery will be required. Thomas J. Slade is president.

The Portsmouth Forge Co., Portsmouth, N. H., has let the contract for altering its forge room to Adolph Such, of Boston.

The P. P. Mast Co., Springfield, O., is to erect a large warehouse immediately and to make other important additions to the plant during the fall.

The Irwin Auger Bit Co., Wilmington, O., is completing a new factory building. The Champion Bridge Co. of that place furnished the structural steel.

The Billings & Spencer Co., Hartford, Conn., manufacturing tools and drop forgings, has taken out a permit for a two-story machine shop 55 x 245 feet.

The plant of the Victor Foundry & Mfg. Co., Hamilton, O., now under construction, includes a brick foundry building, with a floor capacity of 80 x 200 feet, accommodating 75 molders; a large engine and boiler room, casting cleaning room, carpenter shop, fireproof pattern rooms and coke and sand sheds. A cupola of 30 tons capacity will be installed and a full equipment of modern foundry tools for the manufacture of light and medium weight gray iron castings and specialties. The company has a site 400 x 600 feet with ample switching facilities.

The Globe Wire Co., Ltd., Sharpsburg, Pa., has purchased from the United States Foundry & Furnace Co., 1½ acres on the river at New Kensington, Pa., including buildings which will be occupied by the company as soon as the equipment can be removed from the present plant.

The G. Drouve Co., Bridgeport, Conn., is to erect a new factory 50 x 300 feet, one story and basement, on Housatonic avenue, in that city. The company manufactures skylight and sheet metal work.

The Standard Foundry & Steel Casting Co., Pittsburg, Pa., recently organized with a capitalization of $50,000, will erect a steel foundry near that city. The officers are: Arthur E. Pearce, president, and J. M. B. Hoff, treasurer.

The St. Louis Frog & Switch Co., St. Louis, Mo., will erect a new plant for the manufacture of frogs, switches, etc. The plans prepared by Lichter & Jens, consulting engineers, call for the erection of a main building 100 x 200 feet. Arrangements for a considerable part of the machinery have already been made.

The Otto Gas Engine Works is to erect a machine shop of structural steel at its new plant at Wilmington, Del. The crane equipment and the general equipment for the shop have not yet been decided upon.

The Union Pacific railroad is preparing plans for the erection of new shop buildings and improvements in the shop yards at Omaha, Neb., which will necessitate an expenditure of $750,000. These shops will consist of a series of buildings, including freight car and coach repair shops 492 feet long, with a wing 342 feet, one story in height. Heavy cranes for service near the coach shops and for wrecked trucks will be installed in the yards.

The Superior Foundry Co., Cleveland, O., is about to make some large extensions to its present plant. A new core room and molding room 85 x 160 feet and a two-story office building 40 x 50 feet will be erected, and a 15-ton cupola will be installed. This will add about 25 per cent to the company's output, although its capacity has increased one-third during the past year.

The new plant of Merrill Bros., manufacturers of drop hammers, turnbuckles, vises, trimming presses and other special machinery, is in East Williamsburg at the dividing line of the city of Brooklyn and Queens Borough, New York. Ample switching facilities are provided, and for distances greater than 100 miles, flat New York rates are obtained. The company has filled its immediate machinery requirements, but has not yet decided what kind of power will be installed.

The American Tin Plate Co. is overhauling its Gas City, Ind., plant, which closed June 1, and it is stated that the mills will resume operations within a short time.

The National Iron Works, Spokane, Wash., is shortly to move to a site recently purchased along the O. R. & N. railway tracks where a plant to double the capacity of that now occupied will be erected. Considerable machinery will be required and as yet no contracts have been let.

The American Rolling Mill Co., Middletown, O., has broken ground for a 60-foot extension of its mill. A number of other additions to the plant have recently been completed.

The Spokane Machinery & Supply Co., Spokane, Wash., is now occupying its new plant for manufacturing machinery and supplies for saw mills and ice plants, with a specialty of large planers. The new buildings include a machine shop, foundry, store rooms, paint room, testing room, pattern shop, warehouse, blacksmith shop and office.

Confer, Smith & Co., Hamburg, Pa., are extending their foundry to provide fitting and shipping rooms for stoves and other castings. Other extensions are being made.

L. G. McKnight & Co., machinists, Gardner, Mass., have a new factory building almost ready for occupancy. The company has outgrown its present quarters.

The Geo. H. Bushnell Press Co., Thompsonville, Conn., is erecting a temporary home 40 x 120 feet for its bent piping department. Later a main building 88 x 250 feet, with provisions for enlargement, will be erected.

The Columbia Heights Foundry has completed a new machine shop at its plant at Columbia Heights, on the outskirts of Minneapolis.

The Mitchell Safe Co., Inc., Minneapolis, Minn., has work almost completed on a large brick structure at Columbia Heights, which will be used for factory purposes. Machinery is being installed and operations will commence early in August. Charles B. Mitchell is president of the company and Fred J. Sackett is treasurer. Safes of all sizes will be manufactured.

The American Tool Co., Cincinnati, O., expects to remove to Bond Hill, a suburb, and erect a plant and factory colony on 30 acres of land which it owns there.

The Globe Foundry Co., Port Chester, N. Y., has signed a contract with the Chamber of Commerce of Huntington, W. Va., for the location of a plant covering several acres at that place.

John Hewitt, president of the Miehle Printing Press & Mfg. Co., has purchased a site for a manufacturing plant at Robey and Fourteenth streets, Chicago. It is reported that the company will erect a printing press plant.

The American Rolling Mill Corporation will erect a bar iron plant costing $200,000 on a tract of land at Robey street and Canal D, Chicago, recently purchased from Mrs. Charles P. Taft.

The Peerless Automobile Co., of Buffalo, is preparing plans for an extensive factory to be built at Detroit on a tract of land near the American Car & Foundry Co.'s plant.

Extensive additions to the foundry of Williams, White & Co., Moline, Ill., are being considered. Present plans provide for a structure about 135 feet square to occupy the ground between the machine shop and pattern department as an ell to the present foundry.

The Russell-Compton Co., Spartanburg, S. C., recently incorporated, will erect a two-story foundry 40 x 100 feet and a machine shop 55 x 100 feet.

The Anderson, Ind., plant of the American Steel & Wire Co., has resumed operations after a summer's shutdown. During the idleness important additions have been made to the plant, including a brick storage house 100 x 200 feet.

The United States Malleable Iron Co., Toledo, O., has prepared plans for a 10-ton melting furnace and five annealing ovens. It is expected to have these in operation within ninety days.

The Crescent Rotary Engine Co., Spokane, Wash., expects to enlarge its plant in the fall. H. I. Call is manager.

The Commercial Club of Davenport, Ia., has reported favorably on the proposition of the North American Tool Co., Des Moines, Ia., to locate its plant in Davenport. C. M. B. Voss is president of the tool company.

The American Rivet Co., New Haven, Conn., has purchased land on Ashman street for an addition to its plant.

The Davis & Farnum Mfg. Co., Waltham, Mass., is building an addition 59 x 150 feet to its foundry.

The Henry H. Cummings Machine & Sub-Target Gun Co., Boston, is to erect a four-story steel factory building 80 x 200 feet. A large amount of heavy machinery will be installed, the total expenditure being about $60,000.

General Industrial Notes:—

The National Rolling Mill Co., Vincennes, Ind., has declared the usual semi-annual dividend of 3½ per cent, and has elected the following officers: Isaac Lyons, president; George R. Bell, vice president; J. H. Jones, secretary; H. J. Boeckmann, treasurer, and S. N. Bradshaw, general manager, and C. B. Kessiner, H. Brokhage and E. B. Mitchell, directors.

The Winfield Mfg. Co., Warren, O., has purchased the plant of the Warren Steel Metal Co., the consideration being reported at $22,000.

The Parsons, Lane Co., of Sodus, N. Y., is successor to the firm of Parsons & Lane, the officers being W. T. Gaylord, president; B. B. Kelly, vice president; H. L. Kelly, secretary; W. N. Parsons, general manager, and A. H. Lane, treasurer. The company will do general machinery contracting, building special machinery, and specializing in thread milling, cutting blanks furnished or furnishing parts complete of all worms and coarse pitch screws, either standard or special threads.

The Berger Mfg. Co., Canton, O., has purchased the plant of the Waukesha Sheet Steel & Iron Co., Waukesha, Wis., manufacturing sheets and bars with an equipment of six hot mills, a bar mill and two puddling furnaces.

At the annual meeting of the stockholders of the Solid Steel Tool & Forge Co., Tarentum, Pa., held July 16, the following board of directors was elected: H. M. Brackenridge, J. D. Wilson, J. W. Hemphill, J. H. Baker, J. E. McKelvey and R. Miller Jr.

The Barth Elevator Co., Milwaukee, has been purchased by the Otis Elevator Co., which will hereafter operate the plant.

The ore freighter Henry H. Rogers, of the Pittsburg Steamship Co., on its first trip from the ship yard, cleared at Ashland, Wis., with 12,914 net tons of iron ore, which was loaded in four hours at the Northwestern docks. This breaks the record for Lake Superior held by the J. Pierpont Morgan.

The General Fireproofing Co., Youngstown, O., has purchased the business of the San Francisco Fire Proof Co. An addition is being built to the Youngstown plant.

Samuel G. Colt, of Pittsfield, Mass., has purchased the old Cheshire charcoal furnace, at Cheshire, Mass., from the Richmond Iron Co., and will put it in blast.

Fannie furnace of the Cherry Valley Iron Co., West Middlesex, Pa., has been blown out for relining and other extensive repairs, and it is expected will be idle for about two months.

What is said to be the world's record for the manufacture of one-inch wrought iron was broken July 23 at Lorain, O., when 6,023 pipes, ranging from 18 to 20 feet in length, were rolled in 12 hours. The best previous record was 5,000 pipes in this time.

The steel rail mill of the Lake Superior Corporation, which has just completed its first year of continuous operations, shows gross earnings of $5,300,000 on an output of 162,000 tons sold at an average price of nearly $33 a ton.

The number of industries at Rochester, N. Y., in 1905 was 1,119, considerably less than in 1900, although in that period the capital increased 58.2 per cent, or $71,529,724, and wages and products showed heavy increases.

The stockholders' committee of the Etna Steel & Iron Co. recently made a tour of the property near Cedartown, Ga., inspecting the plant with a view of enlarging its capacity to 1,000 tons of ore daily. At the annual stockholders' meeting T. N. Barnsall was elected president.

The Peerless Heater & Valve Co. has removed from Detroit to Saginaw, Mich., occupying the plant formerly occupied by the Auto Brass & Aluminum Co.

The plant of the Ottawa Furnace & Foundry Co., Ottawa, Can., has been purchased by S. J. Travers, of Montreal, and George Tomlinson, G. A. Mothersill and J. I. MacCraken, of Ottawa. The plant closed about six months ago, but the new owners expect to have it operating within a month.

No. 1 Paxton furnace at Harrisburg has been started after a brief suspension, but No. 2 will hardly be put into blast until the hot metal railway is completed.

The real estate and buildings of the Shaw Machine Co., Lowell, Mass., which recently went into the hands of a receiver, was sold last week to a Mr.

Benjamin, 260 Summer street, Boston, representing the American Woolen Co., for $65,000. This includes the engine, boiler, pumping, heating and electric plants.

W. J. Sauer, of Louisville, Ky., has been elected president of the recently organized Ohio Elevator & Machine Co., Columbus, O. Other officers are Owen T. Snyder, vice president and general manager; W. R. Edmister, secretary; and Charles H. Brown, treasurer.

The plant of the Neafie & Levy Ship & Engine Building Co., Philadelphia, is to be sold at auction. The minimum price fixed by court decree is $300,000.

Trade Notes:—

The Ohio Forge Co., mentioned in this column last week as having recently installed new machinery doubling its capacity, is located at Cleveland, O., and not Toledo, as was stated.

The Dubuque Boat & Boiler Works, Dubuque, Ia., is constructing a large steel railroad transport for the Queen & Crescent Railroad Co. The boat will be 351 feet long, and will have a capacity of sixteen loaded box cars. It is said to be the largest ever constructed for inland river service.

The Dubuque Turbine & Roller Mill Co. is building four 100 horsepower turbine mills for the University of Iowa. The power obtained will be used in operating the machinery of the engineering department and lighting plant.

The Niles Tool Works Co., Hamilton, O., is filling a $100,000 order for various kinds of machinery used in the manufacture of cannon. This is being shipped to the Imperial Gun Works at St. Petersburg, Russia.

The Westinghouse Electric & Mfg. Co., Pittsburg, has contracted to supply the electrical equipment of the cars of the Strangen-Wick Railway Co., a suburban line near Stockholm, Sweden. The contract was secured in a test with European competition. This company will also re-equip the cars and power houses of the Shenango & Mahoning Valleys Railway & Light Co.

Thirteen cars loaded with structural iron for the Boston Elevated railroad were recently shipped at one time from the plant of the Fort Pitt Bridge Works, at Canonsburg, Pa. The Boston contract aggregates $1,000,000.

The United States Cast Iron Pipe & Foundry Co. has secured a contract for 110 tons of water pipe for use by Middletown, O. The six-inch pipe is at $31 per ton, and the four-inch at $32.

The "Long Arm" system of electrically operated bulkhead doors is one of the few American exhibits at the Milan Exposition which is now open for the season of 1906. This system is in use on all the new warships of the United States navy.

The E. & G. Brooke Iron Co., Birdsboro, Pa., is installing refrigerating machinery of 350 tons capacity to be used in drying the air blast for its furnaces according to the Gayley process. The air is passed over coils of pipe containing cold brine or ammonia. Part of the moisture contained in the air is deposited on these pipes and that remaining is practically constant, so that the humidity of the blast is uniform. The machinery is being installed by the De La Vergne Machine Co., New York.

The Great Lakes Engineering Co. has received an order from a Bay City syndicate headed by James E. Davidson for a steel freighter of 9,000 tons capacity to come out May 15, 1907. This makes seven ships the Great Lakes Co. is building for 1907 delivery.

The C. H. Hallgath Co., manufacturers' agent, has opened offices in the House building, Pittsburg, and will represent lines of goods for use in steel mills, coal mines, foundries, quarries, etc., including a complete line of trucks and cars for every purpose, paints for iron work, whether exposed to heat, acid or sulphur fumes; a hydraulic valve for use in steel mills, boiler flue expanders and pneumatic drills and reamers.

The Dayton Globe Iron Works Co., Dayton, O., will build four large water wheels, together with the necessary power transmission machinery, for the Trade Dollar Consolidated Mining Co., Silver City, Ia.

The American Ship Building Co. has closed a contract with the Acme Steamship Co. for an ore carrier for 1907 delivery. The new boat will have a carrying capacity of 9,500 tons, and will be a duplicate of the James C. Wallace, which is owned by the Acme company. This order makes 32 vessels which the ship yards of the great lakes are building for delivery next year.

The Minneapolis Steel & Machinery Co., of Minneapolis, Minn., recently secured the exclusive right to manufacture the Munzel gas engine and producer of America. It also secured the American right for the Wilson pressure producer, an English patent which uses soft and hard coal. Within a very short time the company has placed the Munzel engine in fifteen different plants.

The American Locomotive Co. is to build three locomotives of the compound, eight-wheel, passenger type, weighing about 85,000 pounds each for the Kansei railway of Japan.

TRADE PUBLICATIONS.

The Whiting Foundry Equipment Co., Harvey, Ill., in catalog No. 45 describes and illustrates electric travelers and cranes of all types for foundry, machine shop, power house, steel plant, railway shop use, etc. In addition to electric travelers and hand power cranes, numerous jib and bracket cranes, pillar, gantry and transfer cranes are described, together with electric transfer tables and special derricks for railroad and marine service. The catalog contains 162 pages, and is printed in two colors. It is designed to place in the sectional catalog binder used by this company.

The Robert C. Smith Co., 929 Monadnock block, Chicago, is distributing a pamphlet on the Smith system of water softening and purification. The pamphlet contains description and drawings of the apparatus, together with an outline of its mode of operation.

The Landis Tool Co., Waynesboro, Pa., has just published an attractive catalog entitled, "The Landis Grinders and How to Use Them." The catalog is 6 x 9 inches and contains 75 pages, well printed and splendidly illustrated. It describes a complete line of grinders made by this company. These are of all sizes and types and adapted for doing any work that can be done on a grinding machine.

The Osborn Mfg. Co., Cleveland, is distributing a small booklet devoted to "Economy" wire wheel brushes for cleaning castings and metal patterns, removing scale from hot metal for axes, shovels, etc., and for cleaning brass, sheet and copper. It is made in a number of different styles for different purposes, and in sizes from 6 to 15 inches in diameter.

The Crocker-Wheeler Co., Ampere, N. J., in bulletin No. 64 describes form I motors and generators. The motors range from three to forty-five horsepower and are especially adapted for the driving of machine tools.

The Globe Machine & Stamping Co., Cleveland, has just issued a very neat little pamphlet illustrating and describing their tumbling barrels. This booklet describes the tilting type of tumbling barrel manufactured by this company. It also describes and illustrates some new improvements and attachments for these tumbling barrels. In addition to these, the horizontal tumbling barrel, an entirely new type, is described and illustrated. The company also manufactures sheet metal stampings, various forms of dies and other machinery specialties..